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World Trade Readjustments After the War

Export Business Will Be on a New Basis Then—How It Can Help the Domestic Manufacturer to Tide Over

BY STERLING H. BUNNELL

It is a common remark among shop men that it is always "a feast or a famine." A history of trade conditions in the United States would chronicle a succession of periodic alternations between too much business and too little business. The manufacturer has never been able to plan his work, schedule his output and proceed at a regular pace, without the uncomfortable knowledge that he would soon find himself oversold or overbought, in a market rapidly going the wrong way for his interests. Prosperity in the business world is followed by demands for higher wages, then labor troubles multiply, prices rise, purchasing diminishes accordingly, retrenchments in manufacturing programs ensue, with decreasing demand for labor, and soon the majority of workers decide to wear their best suits of clothes a little longer, and put off the purchase of everything not immediately necessary. The effect is to pull down the whole edifice of prosperity through the simultaneous but unconcerted cutting down of purchases. The cycle is completed when the resulting fall in prices brings out the savings effected by economies and again purchasing begins to increase.

EUROPE'S NEEDS TURNED THE TIDE

Many men seem to have forgotten that a serious business depression followed the slashing of import duties on manufactured goods a year before the European war commenced. Whether a coincidence or a consequence, the depression continued without any sign of an upturn in the summer of 1914, when it merged in the general crash of values which followed the outbreak of the great conflict.

For a few weeks it seemed that there could be nothing ahead but greater business stagnation in the United States. But soon some few of the financial and business leaders perceived the necessities which confronted those of the European nations who had entered the war without adequate preparation, and must buy at any cost. These men filled the shops which they already controlled or were able to engage, with orders for war supplies of every kind, at a scale of prices which rapidly advanced as the demand grew. In the course of time the increase in European buying lifted the United States from one of the worst of its business depressions, where home production and consumption had shrunk to the minimum, to the extreme limit of industrial prosperity as an exporting nation. This effect was brought about without the slightest effort

on the part of American concerns to provide facilities for conducting export business. The foreign purchasers were obliged to come to this country, seek out the sources of supply and put up cash in advance with their orders.

The curtailment of production in Europe by the withdrawal of workmen to enlist as soldiers has caused a continued decrease in the supply. We have reached the point where all prices are set by European needs, and the home market must pay what is asked or go without. Manufacturing in the United States has been forced to the limit. All producers are sold up to capacity, some have booked sales for months ahead, and many have fallen so far behind with their deliveries that they will not even attempt to schedule them. Tracers from assembling shops wait in testing rooms to lay hands on and ship parts the instant they are finished, so that their shops in turn may be able to complete the machines that are waiting.

PRICES RISE EASILY

The peculiar feature of the present trade situation is the ease with which prices can be raised. In normal times men have certain principal index figures in mind, like dollar wheat, 10-cent cotton, and unskilled labor at \$1.50 a day. Any considerable advance in the normal average of prices meets strong resistance, decreases purchases and so tends to bring about its own cure. During the past year, and at present, this counter check has been ineffective. Every increase in wages or material is a cause for a perfectly cheerful upward revision of the manufacturer's price-list, and forms a link in a whole chain of corresponding increases by others whose costs are affected.

If all price increases had been exactly proportional, the market would now be in much the same condition as if by common consent the value of the dollar had been cut in two, and everywhere a dollar passed for half a dollar only—with all foreign coins, of course, undergoing by common consent a similar change in value. However, though price changes have been often disproportionate, they tend to equalization in the course of time. But it is not at all an indisputable proposition that prices will eventually return to near their former figures, instead of remaining at some new and hitherto unheard-of level.

Great readjustments, however, are certain to take place whenever the present trend changes.

The close of the European war will be preceded by a slackening of purchases for European government account. The sensitive market will respond by a decrease in inquiry from all home sources in the expectation of a fall in prices. Manufacturers will not object to a relief from the tension under which they have been operating, and will use the opportunity to revise their lists of employees and their pay-rolls, retaining the useful workers and dropping the inefficient. The period of retrenchment will set in, and sharp contraction will follow in all lines of trade. The unknown factor is the time that the reverse movement will endure.

WHEN THE TURN COMES

The tide will be turned by the buying power of Europe after the war—at present a matter of conjecture. Much has been destroyed in battles and campaigns, and a large proportion of the equipment of trade workers and farmers has been worn to the point of necessary replacement. There will be a tremendous demand for building materials, tools and farm machines. It seems probable that the resumption of manufacturing in these lines, in countries now at war, will be delayed for months, while the first purchases after the war embargoes are lifted will be made in the countries not engaged in the conflict.

When this opportunity occurs, those manufacturers in the United States who have already provided export connections will obtain the advantage over the others who have not. Unlike a government at war, the civilian purchaser can take his time and make his choice of terms. It is certain that he will not consent to hand over his funds to an American bank to lie idle for months while his purchases are being ordered, manufactured and delivered. He will, as before the war, buy at home if possible, from a local agency or importing firm. He will want to order the goods from catalogs or samples, and to have them delivered at his place of use without further attention on his part. He will expect to pay for his purchase on an extended credit. If he cannot buy American made goods a little more easily than the goods offered by manufacturers in nations whose fortunes have been cast with his own in the war, he will place his orders elsewhere than in the United States.

PREPAREDNESS FOR THE NEW EXPORT BASIS

Export business is going to be of an enormous assistance to manufacturers in the readjustment period which will follow the first signs of the end of the present conflict. It will probably continue to be an important factor in our industrial prosperity, in spite of whatever may be done, through trade alliances between other nations than ours, to tend to confine trade to nations within such alliances. But in order to get both early and continued benefit from export trade, it is necessary for the American manufacturer to get ready for it in advance. He should inform himself as to the suitability or adaptability of the goods he makes, for foreign use. He should work out the best means of packing his product for export, and the details necessary in invoicing and clearing through customs. He should obtain the foreign catalogs of competitors previously established in the trade of the country where he wishes to sell, and decide what is good and bad in their sales presentation, and what is therefore to be imitated, improved, or avoided in putting forth his own lines. He should employ and train in his own business the necessary correspondents, at least a well-educated stenographer of the nationality of the prospective buyers,

who can act in the capacity of translator. Most important of all, the manufacturer should arrange banking connections abroad, so that his sales may be made on terms convenient to the buyer.

It has been the great fault of the American business world, that almost nothing has been done to develop and promote convenient methods of export trade. Great Britain and other countries, Germany above all, have developed their enormous trade with foreign countries through the direct efforts of commercial houses which combine banking, shipping, and sales functions at both ends of every export route. Such firms act as convenient bridges between seller and buyer, making it exactly as easy for a European manufacturer to effect a sale to a buyer in Singapore or Cape Town, as to his neighbor trading within five miles of the factory. We in America have had one such firm where England, for instance, had hundreds.

SERVICE OF EXPORT HOUSES

It is often said that Russia has been awakened by participation in the great war so that she is certain to develop a huge foreign trade. It may be said as truly that the war has also awakened the United States to the possibilities of foreign trade. Already several new American exporting corporations have been organized, which offer the same facilities for export sales to foreign countries that developed the export business of England, Germany and other trading nations. The services of such houses make it possible for any manufacturer in the United States to make profitable sales abroad. They provide banking connections for financing sales on long terms of credit, while paying cash against documents to the manufacturer. They have shipping, invoicing and insurance departments; engineering offices, with purchasing departments in the exporting country and technical sales departments at the importing end. They provide for translating and preparing advertising matter in the foreign language. They afford means for exhibiting samples, showing machinery in operation, and carrying the necessary stocks of repair parts abroad. They also furnish the services of specialists with broad experience in the peculiarities of export trade. To perform all these functions would cost a prohibitive amount to any but the largest of corporations, but the export house carries its expense over an enormous amount of business at a trifling expense for each sale, far less than the smallest sales commission customary in domestic business.

For the future prosperity of our country it is to be hoped that the large majority of American manufacturers will make use of the export facilities which are being offered. It is time now to begin to develop the details necessary for a sales campaign after the war, which will help to maintain a balance of trade favorable to the United States.

Steel tires for motor cars are now being used in Germany because of the scarcity of rubber. They consist of dozens of fine steel threads woven together and fixed over an inner band of rubber. After running about 3500 miles the steel cover is worn out and has to be replaced. The rubber inner band remains intact. It is stated that the effect of the steel tires is to retard the speed and make the riding rough.

The Lackwanna Iron & Steel Company has blown in the North Cornwall furnace, near Lebanon, Pa. This stack was practically abandoned years ago when the Lackawanna Company took over the three furnace plants of the Freeman estate at Cornwall.

TWO LABOR-SAVING SCHEMES

Results of Recent Plant Rehabilitation by the Newton Machine Tool Works

The growth of the business of the Newton Machine Tool Works, Inc., Twenty-third and Vine streets, Philadelphia, Pa., has necessitated a number of changes in the arrangement of machines to expedite successive machining operations and permit the grouping of like tools for departmental supervision. This was made necessary by the fact that the expansion of the works in the past, following an increase in the size of the metal-working machines built, was accompanied by the addition of new equipment in individual units and resulted in irregular grouping of like machines that compelled an indirect routing of work through the shops.

In making these changes the lathes were divided into two departments, one for medium-sized work on the third floor with the heavier tools on the first floor. In the former department the units were grouped according to their adaptability to turn steel or cast-iron gear blanks, shafting, screws, bushing or chuck work, and the earlier ones were equipped with modern lubricating facilities. In this department suspension chains with a turnbuckle were mounted over each chucking lathe to eliminate the necessity of the operator, and possibly a helper, lifting the chuck from the floor to the lathe and vice versa.

In connection with these changes in the productive departments, the engineering and administration departments are also being equipped with labor-saving devices. At the present time the change in the former department, from the second floor at the west end of the building to the third or



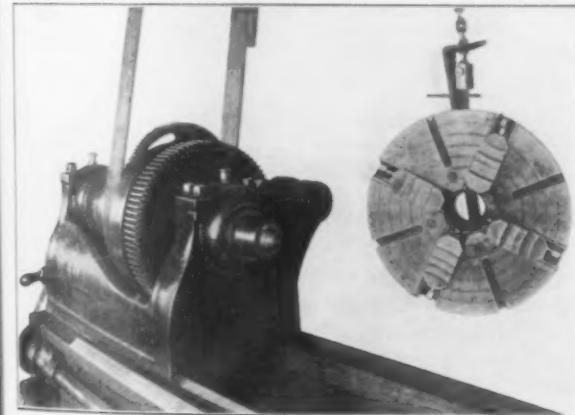
The Large Blackboard at the Right of the Drafting Room Is Employed for Full-Size Sketches of New Developments

able floor boring, drilling, milling and slotting machines, mounted on a system of floor plates, and the heavy lathes, spur and bevel gear and worm cutting and milling machines; key seating, milling and slotting machines; vertical boring and turning mills; tire-expanding machines and worm and worm wheel sand-lapping machines are located on either side in adjacent bays. The remaining section is devoted entirely to erecting, the main and two side bays being equipped with traveling cranes. The cranes in the main bay travel from one end of the plant to the other. In addition to the lathes on the third floor, the thread milling, combined bushing boring and spiral oil grooving and screw machines are placed there with a service elevator at the west end and a delivery elevator at the opposite one, connecting with key seating and gear cutting departments on the first floor adjacent to the assembly department.

Device for Calculating Drawing Die Sizes

A modified form of circular slide rule has been developed by Otto H. Jensen, 44 Horton Place, Buffalo, N. Y., for calculating the dimensions of double-action drawing and combination dies. It consists of three circular pieces of celluloid, one of which is graduated around the entire periphery, while the graduations on the other two cover a much smaller portion. The device is designed to give the maximum draw obtainable whether a blank is to be drawn into a shell or the shell thus formed reduced to one of smaller diameter. By manipulating the different dials in accordance with instructions furnished with the calculator, it is a simple matter to determine the diameter of the dies required for drawing and redrawing work from different gages of sheet metal. A table of thicknesses for various gages of sheet steel and tin plate is given on the back of the calculator.

Several railroads have filed suit in the Federal courts at various points to test the constitutionality of the eight-hour law recently passed by Congress and known as the Adamson act. The bill of complaint alleges that the law is unconstitutional because it is not a proper regulation of interstate commerce, because it violates the guarantees of the fifth amendment to the constitution, and because it is unworkable as applied to existing conditions under which the trainmen are operating.



In the Lathe Department the Chucks Are Suspended as Shown by a Chain and Turnbuckle to Eliminate Lifting from the Floor

top floor at the opposite end where the benefit of overhead lighting from skylights can be enjoyed, is under way. The large blackboard shown in one of the accompanying illustrations will be retained by the engineering department in the new location. This board is used for the drawing of new developments in machine-tool design to a full-size scale, which gives a better idea of the proportions.

The shop proper extends along Vine Street from Twenty-third to Twenty-fourth, a distance of 400 ft. The heavy material is received at the Twenty-fourth Street end of the first floor and travels through the plant, coming out finally at the shipping department at the opposite end of the building, which has a railroad siding. The shop is divided into three sections from west to east, the heavy planing and floor boring machines being located in the first one. The middle portion of the shop contains port-

Heat Balance of a Blast-Furnace Stove*

Results of the Operation of Cowper Stoves at a British Plant—Details of the Heat Produced, Absorbed and Lost

BY R. S. G. KNIGHT

THE work recorded in this report was carried out at the blast-furnace plant of the Skinningrove Iron Company, Ltd., Skinningrove, Yorkshire, England. Unfortunately, owing to the disposition of the plant, which did not permit a direct measurement of the gas supplied to the stove being made, it was not possible to obtain as complete data for a heat balance as was hoped for. Nevertheless, by assuming a certain reasonable radiation loss, and averaging the results of the analyses of the products of combustion, it is possible to deduce from the experimental figures an approximate heat balance.

THE PLANT

The stove selected for these experiments was one of a battery of 13 Cowper stoves used for driving five furnaces. At the time of this investigation, however, three stoves and one furnace were down for repairs, so that the four furnaces were being driven from ten stoves.

The stoves draw their gas from a common underground main into which the whole of the gas from the furnaces is led, the surplus gas being used on other parts of the plant. The hot blast from the batch of stoves is led into a common main, running along the back of the furnaces and communicating with each of these by the horse-shoe main. In practice the stoves are worked as a whole, there being no rigorous division between them for any furnace. Of the 10 stoves in use for the four furnaces, six are on gas and four on blast at the same time, each furnace being blown from one stove. The stove is usually kept on gas for about one and a half hours, and on blast for one hour, but these times vary with the working of the furnaces and the condition of the stoves. As a general rule each stove blows for half an hour on one furnace and for the remaining half hour on another furnace, so that No. 11 stove usually blew No. 5 furnace during the first half hour and was then changed over to No. 4 furnace, a fresh stove taking its place on No. 5. The whole working of the stoves, however, has to be run according to the requirements of the furnaces, so that no hard and fast rules can in any way be laid down.

THE STOVE USED FOR THE TRIAL

The stove is 60 ft. 6 in. high and 23 ft. diameter, and is lined with firebrick to a depth of 1 ft. 6 in. in the regenerator portion and 2 ft. 8 in. in the flame flue. This flue is elliptical instead of circular. The gas enters the stove from the underground main through the gas nozzle at the bottom of the flame flue, the supply being regulated by a plate valve at the base of the nozzle. The air for combustion is drawn from the atmosphere through the air port situated about 7 ft. from the ground and a little to the left of the gas inlet. The products of combustion travel to the top of the flame flue and then pass down the regenerator portion,

composed of firebrick checker work, through the valve box into the flue leading to the stack.

On the reversal the air enters from the cold blast main through two smaller mains (each 21 in. in diameter), one on each side of the valve box. The air travels in the reverse direction to that previously taken by the gas, passing first through the regenerator and then down the flame flue to the hot blast main, which is situated 14 ft. 6 in. from the ground level and immediately above the air port. The hot blast valve is water cooled.

ITEMS IN THE BALANCE SHEET

The several items comprising the balance sheet may be set out as follows:

Debit Side

1. The heat produced by the combustion of the gas.
2. The sensible heat contained in the gas.
3. The heat contained in the dust entering the stove with the gas.
4. The heat contained in the moisture entering the stove with the gas.

Credit Side

1. The heat carried away as sensible heat in the flue products.
2. The heat required to raise the temperature of the blast.
3. The heat used in raising the temperature of the moisture contained in the blast to the hot blast temperature.
4. The heat carried off by the dust swept from the stove into the flue.
5. The heat carried off by the water vapor leaving the stove.
6. The heat lost from the stove by radiation, conduction, and convection.

The above balance is valid only when the condition of the stove is the same at the end of the trial as at the beginning. During the period of the stove is on gas the checker work is heated up to a certain extent. The flue temperature, as may be seen from Fig. 1, becomes nearly constant after about half

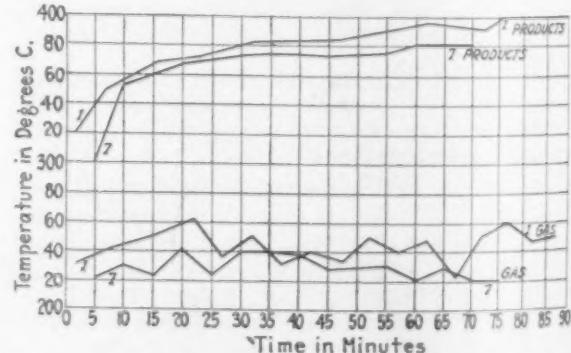


Fig. 1—Records of Gas and Flue Temperatures

an hour. This shows that the larger the amount of gas put into the stove the greater is the amount of checker work raised up to the average temperature; that is, the greater is the heat reserve of the stove. In a single reversal it is quite possible to

*From a paper which was granted a Carnegie Scholarship memoir by the Iron and Steel Institute in May, 1916.

get more heat out of the stove than was put in during the period the stove was on gas. Therefore, in order to obtain a reliable heat balance, it is absolutely necessary to carry the test over as many consecutive reversals as possible, the longer the trial the greater, *ceteris paribus*, being the accuracy.

In this investigation the test was run for a period of about 24 hours, comprising nine complete reversals. The methods and apparatus used in the evaluation of the several items of the balance sheet to which special attention was given are described in detail as follows:

1. HEAT PRODUCED BY THE COMBUSTION OF THE GAS

The determination of this factor involved the following:

- (a) The temperature and pressure of the gas.
- (b) The calorific value of the gas.
- (c) The amount of gas at N.T.P. entering the stove.

(a) The temperature of the gas was taken by a Hoskins base metal couple and indicator supplied by the Foster Instrument Company, and previously calibrated in the Fuel laboratories of the Imperial College of Science, London. A rivet was removed from the gas nozzle near the plate valve and the couple fixed in at this point. In this position the effect of direct radiation from the wall of the flame flue was less than it would have been had the couple been inserted on the side of the bend near the gas inlet. A pressure gage was fixed near the mouth of the nozzle through a similar rivet hole. Fig. 1 shows the records of both the gas and flue temperatures obtained in experiments 1 and 7 of the test.

(b) The calorific value of the blast-furnace gas was obtained by calculation from its analysis. Since the gas varies but little in its composition three samples only were taken, and these at equal intervals during the trial. Each sample was continuous over the period the stove was on gas, and was drawn from the nozzle into a gas holder over glycerine and water (1 : 1) and analyzed at the completion of the test.

(c) The measurement of the amount of gas entering the stove involves the determination of its velocity, but after many attempts it was found impossible to obtain

stove the eddy was indicated by the stream lines on the dust in the mouth of the nozzle, which lay parallel to one another in a direction about 70 deg. from that of the gas flow.

The eddy motion is undoubtedly due to the change of pressure occurring at the plate valve, caused by the rush of gas through a restricted opening. The pressure on the furnace side of the plate valve was approximately 3 in. water gage, while in the nozzle the gas was under a suction of about 1½ in. water gage.

It will be seen from the drawing of the stove that under existing conditions at no point between the mouth of the nozzle and the underground gas main could any reasonable measurement of the velocity be made except by fully opening the plate valve and fixing an adjustable diaphragm at the mouth of the nozzle. Even in this case the measurement would have had to be taken as far as possible from the diaphragm, as the effect of the reversal of pressure would be apparent for some distance on the furnace side of the diaphragm.

The amount of gas passing into the stove might be determined indirectly either from the quantity of flue products or from the amount of air used for combustion. Both these methods were impossible on account of the disposition of the plant.

2. THE SENSIBLE HEAT IN THE GAS ENTERING THE STOVE

The experimental data required for the calculation of this item, namely, the measurement of the temperature, pressure, and quantity of gas used in each test, have already been considered in the previous paragraph.

3. THE HEAT CARRIED OFF IN THE FLUE PRODUCTS

The evaluation of this factor requires a knowledge of the temperature of the products of combustion, together with the average analysis and quantity passing into the flue during each period the stove is on gas.

The temperature was taken by a base metal thermo-couple inserted in the short length of main between the stove and the valve box, and connected to an indicator from which readings were taken at five minute intervals. During each run a continuous sample of the products was drawn into a gasholder containing glycerine and slightly acid water (1 : 1), from a tube fixed in the valve box. These samples were analyzed at the completion of the test.

The determination of the quantity of products and of the excess air used in the combustion is best found by calculation from the amount of gas used, on the basis of the carbon content of the gas and of the products. Since, however, the amount of gas used could not be directly measured, it is impossible to get either the quantity of products or the amount of excess air by direct methods.

4. HEAT REQUIRED TO RAISE THE TEMPERATURE OF THE BLAST

In order to find the heat taken up by the blast it is necessary to determine the temperature and pressure of the cold blast, the temperature of the hot blast, and the quantity of blast blown per hour.

The temperature of the cold blast was read at intervals from a mercury thermometer placed in one of the two inlet mains. The blast pressure was taken from a Bristol recording gage permanently connected up to the cold blast main.

The hot blast temperature was taken by a base metal couple fixed in the hot blast main directly behind the stove valve, and connected up to a calibrated recorder from which readings were taken at intervals of five minutes.

The quantity of blast used was calculated from its velocity in each of the two inlet mains. For this purpose Pitot tubes of the form shown in Fig. 2 were employed. These tubes were fixed in each of the mains with the tips facing the air stream, the dynamic tip being about one-sixth of the diameter of the main from the circumference. The two tubes were connected up to the differential pressure recorder which consists of a float moving in water contained in a closed cylindrical iron vessel. The static pressure acts on the upper

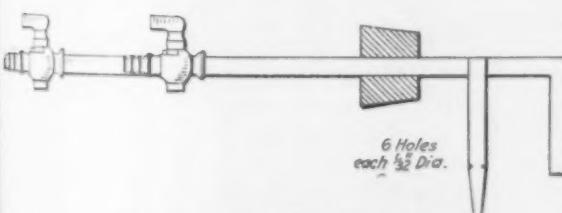


Fig. 2—Style of Pitot Tubes Used

this directly. The method tried was to fix specially designed Pitot tubes in the mouth of the nozzle, connect these to a recording differential pressure gage, and from the average dynamic pressure to calculate the velocity.

The Pitot tubes were bound securely in position and the space between the nozzle and the opening in the stove was closed up with clay to prevent the entrance of air, which would produce eddy currents and so vitiate the records. The differential recorder used in conjunction with the tubes had a range of only ¼ in. pressure of water. The records thus obtained were altogether unsatisfactory, showing a velocity head of very much less magnitude than was reasonable, and corresponding in no way with the variations of the gas pressure. Careful search showed that the cause of failure was due to the fact that the gas entered the stove with an eddy motion almost at right angles to the direction of flow.

In those stoves where a portion of the air for combustion is drawn through an inner tube fixed in the gas nozzle, this eddy motion can be readily seen, as the flame is quite black in the center but increases in luminosity toward the circumference, the dust having been thrown outward by the circular movement. In No. 11

side of the float and the combined static and dynamic pressures act on the under side, so that the movement of the float is caused by the difference between these, namely the dynamic pressure of the air. This difference is recorded by a pen attached to the float marking on the chart affixed to the revolving drum. The instrument was designed to work at 5 lb. pressure and to have a range of $1\frac{1}{2}$ in. with a magnification of 4 : 1. The velocity of the blast is calculated from the average dynamic pressure during the test, using Grigg's formula:

$$V = 0.997 \sqrt{\frac{2ahw}{12d}}$$

where

V = The velocity in ft./sec. at the temperature and pressure of the main.

g = Acceleration due to gravity (33.2 ft./sec.).

w = The weight of 1 cu. ft. of water = 62.4 lb.

h = The dynamic pressure in inches water gage.

d = The weight of 1 cu. ft. of the gas at the temperature and pressure of the main.

DETAILS OF THE TRIAL

The trial was commenced at 11.53 a. m. on March 11, 1915, when the stove was put on gas, and was continued during nine reversals ending at 11.48 a. m. on March 12.

A summary of the results obtained is given in the two following tables:

Table 1—Stove on Gas

Experiment	Time	Average Gas Temp.	Average Flue Temp.	Average Gas Pressure in Ins. w. g.	Gas Plate Opening, Inches	Air Port Opening, Inches	Analysis of Gas	Analysis of Products
1	H. M. 1 31	243	380	-1.4	17 $\frac{1}{4}$	6 $\frac{1}{8}$	CO ₂ 9.2 CO 30.5 H ₂ 1.3 N ₂ 59.0	CO ₂ 12.2 O ₂ 9.8 N ₂ 78.0
2	1 28	249	371	-1.3	18 $\frac{1}{2}$	7	CO ₂ 11.2 O ₂ 12.2 N 76.6	
3	1 19	256	369	-1.5	17 $\frac{1}{8}$	6 $\frac{1}{8}$	CO ₂ 14.9 O ₂ 7.6 N ₂ 77.5	
4	1 19	266	373	-1.3	18 $\frac{1}{8}$	6 $\frac{1}{8}$	CO ₂ 9.7 CO 29.5 H ₂ 0.7 N ₂ 59.1	CO ₂ 15.3 O ₂ 7.7 N ₂ 77.0
5	1 54	246	356	-1.4	17 $\frac{1}{4}$	5 $\frac{1}{8}$	CO ₂ 17.2 O ₂ 5.4 N ₂ 77.4	
6	1 34	228	374	-1.5	17 $\frac{1}{2}$	6 $\frac{1}{4}$	CO ₂ 15.9 O ₂ 5.9 N ₂ 78.2	
7	1 18	229	367	-1.4	17 $\frac{1}{8}$	5 $\frac{1}{4}$	CO ₂ 9.5 CO 30.0 H ₂ 1.2 N ₂ 59.3	CO ₂ 18.4 O ₂ 4.7 N ₂ 76.9
8	1 23	222	356	-1.2	(a) 18 $\frac{1}{8}$ (b) 16 $\frac{1}{8}$	(a) 7 (b) 5 $\frac{1}{4}$	CO ₂ 14.6 O ₂ 7.5 N ₂ 77.9	
9	1 30	222	346	-1.3	(a) 16 $\frac{1}{4}$ (b) 15	(a) 5 (b) 3 $\frac{1}{2}$	CO 16.9 O ₂ 6.1 N ₂ 77.0	

Table 2—Stove on Blast

Experiment	Time	Average Hot Blast Temp.	Average Cold Blast Temp.	Average Blast Pressure in lbs. per Sq. In.	HYGROMETER		PITOT TUBE HEAD IN INS. W. G.	Right-Hand Main	Left-Hand Main
					Wet	Dry			
1	H. M. 1 16	737	25	4.75	13.2	14.2	1.00	0.770	
1	1 4	743	26	4.75	10.7	10.8	0.917	0.718	
3	1 8	723	24	4.5	9.4	9.4	0.910	0.721	
4	1 18	709	22	4.6	9.4	9.4	0.956	0.741	
5	1 2	703	22	4.5	9.3	9.4	0.832	0.714	
6	1 1	743	21	5.0	9.4	10.0	0.610	0.490	
7	1 7	722	22	4.6	9.7	10.3	0.788	0.650	
8	0 57	730	23	4.5	10.1	10.8	1.07	0.882	
9	0 53	727	24	4.2	10.2	11.4	0.893	0.718	

CALCULATIONS

1. The Heat taken up by the Blast

It is first necessary to find the average velocity of the blast in each of the two mains during each experiment.

Considering the right-hand main in Experiment 1, we have:

Pressure of blast = 4.75 lb. per sq. in.

Temperature of blast = 25 deg. C.

The weight of 1 cu. ft. of air at this temperature and pressure = 0.09788 lb.

In Grigg's formula—

$$V = 0.997 \sqrt{\frac{2ahw}{12d}}$$

$g = 32.2$ ft./sec.

$h = 1.00$ in. water gage

$w = 62.4$ lb.

$d = 0.09788$ lb.

$$\therefore V = 0.997 \sqrt{\frac{64.4 \times 1.00 \times 62.4}{12 \times 0.09788}} = 58.33 \text{ ft./sec.}$$

Since the area of each main = 2.281 sq. ft. and the duration of Experiment 1 was 1 hr. 16 min. (= 4560 sec.), the amount of blast blown through the right-hand main

$$= 58.33 \times 2.281 \times 4560 = 606,800 \text{ cu. ft.}$$

Similarly the blast blown through the left-hand main..... = 532,300 cu. ft.

$$\text{Total} \dots \dots \dots = 1,139,100 \text{ cu. ft.}$$

= 1,380,000 cu. ft. at N.T.P. = 0.243.

1 cu. ft. of air at N.T.P. requires 8.898 cal. per deg. C. rise in temperature.

∴ The heat required to raise 1 cu. ft. of air from 25 deg. C. to 737 deg. C.

$$= \frac{712 \times 8.898}{1000} = 6.3354 \text{ K.C.U.'s.}$$

∴ The heat required to raise the temperature of the blast blown in Experiment 1: = 1,380,000 × 6.3354 = 8,744,000 K.C.U.'s.

The results for each experiment are given in the following table:—

Table 3—Results of Each Experiment

No. of Experiment	VELOCITY IN FT./SEC.	AMOUNT OF BLAST BLOWN		Total at N.T.P.	No. K.C.U.'s Required to raise Temp. of Blast
		Right-Hand Main	Left-Hand Main		
1	58.33	51.17	606,800	532,300	1,139,100
2	55.94	49.49	490,100	433,600	923,700
3	55.90	49.76	520,400	463,300	983,700
4	56.96	50.13	608,200	535,300	1,143,500
5	53.27	49.35	452,200	418,800	871,000
6	44.94	40.29	375,300	336,400	711,700
7	51.70	46.96	474,200	430,800	905,000
8	61.93	54.94	483,300	428,700	912,000
9	55.84	50.05	405,200	363,200	768,400
				Total	10,111,000

2. The Heat taken up by the Moisture in the Blast

The average humidity of the air, deduced from the wet and dry bulb hygrometer readings taken during the test = 0.95, whence—

The amount of water vapor per cubic meter of air = 9.0 gram.

The amount of water vapor per cubic foot of air = 0.255 gram.

The amount of water vapor per cubic foot of air at N.T.P. = 0.265 gram.

The total volume of air used = 10,111,000 cu. ft.

∴ The amount of water entering the stove with the blast = 2679 kilogram.

The heat required to raise 2679 kg. of water from 25 deg.

C. to 100 deg. C. = 75 × 2679 = 200,900 K.C.U.'s.

The heat required to evaporate 2679 kg.

of water from and at 100 deg. C. = 536 × 2679 = 1,436,000 K.C.U.'s.

The heat required to raise 2679 kg. of

steam from 100 deg. C. to 727 deg. C. = 627 × 2679 × 0.505 = 816,000 K.C.U.'s.

Total = 2,452,900 K.C.U.'s

3. The Sensible Heat of the Gas per Cubic Foot at N.T.P.

The average composition of the gas is:

	Per Cent
Carbon dioxide, CO_2	9.5
Carbon monoxide, CO	36.0
Hydrogen, H_2	1.0
Nitrogen, N_2	59.5

The mean specific heats of these gases between 0 deg. C. and 200 deg. C. are:

Carbon dioxide, CO_2	0.222
Carbon monoxide, CO	0.243
Hydrogen, H_2	3.410
Nitrogen, N_2	0.241

whence the heat required to raise 1 cu. ft. of this gas 1 deg. C.

$$= 8.984 \text{ calories} = 0.008984 \text{ K.C.U.'s.}$$

The average temperature of the gas = 240 deg.

$$\begin{aligned} \text{The sensible heat of the gas per cubic foot at N.T.P.} \\ = 240 \times 0.008984 \text{ K.C.U.'s.} \\ = 2.156 \text{ K.C.U.'s.} \end{aligned}$$

4. The Heat of Combustion of the Gas per Cubic Foot at N.T.P.

The heat of combustion of hydrogen per gram-molecule = 68.36 K.C.U.'s.

The heat combustion of carbon-monoxide per gram-molecule = 67.96 K.C.U.'s.

Whence the heat of combustion of blast-furnace gas of the composition given above = 27.54 K.C.U.'s per cu. ft. at N.T.P.

5. The Heat carried off by the Products per Cubic Foot (at N.T.P.) of Gas Burnt

The average analysis of the products of combustion is:

	Per Cent
Carbon dioxide, CO_2	15.2
Oxygen, O_2	7.4
Nitrogen, N_2	77.4

For perfect combustion we should have:

Gas	Products
CO_2 9.5	CO_2 9.5
CO_2 36.0 + 15 O_2 + 60 N_2	CO_2 36.0 + N_2 60.0
H_2 1.0 + 1.5 O_2 + 2 N_2	N_2 2.0
N_2 59.5	N_2 59.5
100.0	CO_2 39.5 + N_2 121.5

15.2 cu. ft. of CO_2 are contained in 100 cu. ft. of products. 39.5 cu. ft. of CO_2 are contained in 260 cu. ft. of products. i.e. every 100 cu. ft. of gas burnt yields 260 cu. ft. (at N.T.P.) of products.

But for perfect combustion every 100 cu. ft. of gas gives 161 cu. ft. of products.

$$\therefore \text{Excess air per 100 cu. ft. of gas} = 99 \text{ cu. ft.}$$

(A) The Heat required to raise the Temperature of the Excess Air

$$\text{Initial air temperature} = 15 \text{ deg.}$$

$$\text{Average temperature of flue products} = 366 \text{ deg.}$$

The heat required to raise the temperature of the excess air = $0.99 \times 28.32 \times 1.2931 \times 0.237 \times 0.351$

$$= 3.015 \text{ K.C.U.'s per cu. ft. (at N.T.P.) of gas burnt.}$$

(B) The Heat contained in the Theoretical Products of Combustion

Every 100 cu. ft. of gas burnt yields

$$\begin{aligned} 39.5 \text{ cu. ft. of } \text{CO}_2 \\ 121.5 \text{ cu. ft. of } \text{N}_2 \end{aligned} \text{ at N.T.P.}$$

The sensible heat contained in these at 366 deg. C. is:

$$\begin{aligned} \text{CO}_2 39.5 \times 28.32 \times 1.9651 \times 0.227 \times 0.366 \text{ K.C.U.'s.} \\ \text{N}_2 121.5 \times 28.32 \times 1.2514 \times 0.242 \times 0.366 \text{ K.C.U.'s.} \end{aligned}$$

$$\text{Total} = 5.641 \text{ K.C.U.'s.}$$

The total heat carried off by the products of combustion = 8.656 K.C.U.'s per cubic foot (at N.T.P.) of gas burnt.

Now if x = the number of millions of cubic feet (at N.T.P.) of gas burnt during the whole trial

Then the total heat put into the stove is made up of:

$$\text{The sensible heat in the gas.} 2.156x \text{ million K.C.U.'s}$$

The heat of combustion of the

$$\text{gas.} 27.54x \text{ million K.C.U.'s}$$

$$\text{Total} = 29.696x \text{ million K.C.U.'s}$$

The total heat obtained from the stove is made up of:

$$\text{The sensible heat in the products.} 8.656x \text{ million K.C.U.'s}$$

$$\text{The heat taken up by the blast.} 63.220 \text{ million K.C.U.'s}$$

The heat taken up by the moisture in the blast	2.453 million K.C.U.'s
The heat lost by radiation (say 5 per cent)	$1/20 \times 29.696x \text{ million K.C.U.'s}$
Total	$10.141x + 65.673 \text{ million K.C.U.'s}$

$$\therefore 29.696x = 10.141x + 65.673,$$

$$x = 3.359$$

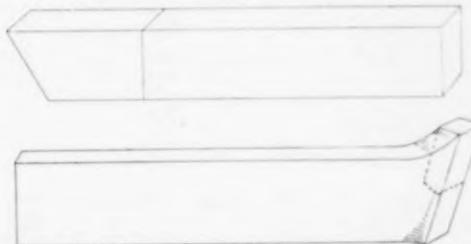
This gives for the heat balance of the stove:

Credit Side	Debit Side	Per Cent
Sensible heat in the gas. 7.3	Heat taken by blast....	63.3
Heat of combustion of the gas	Heat taken by moisture in blast.....	2.6
..... 92.7	Heat taken off by products	29.1
100.0	Heat lost by radiation..	5.0
		100.0

New Electric Welded High-Speed Tools

In addition to the tool holder with an inserted Stellite cutter which was illustrated in THE IRON AGE, Oct. 28, 1915, the Ready Tool Company, Bridgeport, Conn., has placed on the market two new tools in which the high-speed steel or Stellite used as a cutting point is welded to a shank of ordinary steel.

One of the tools is made by the electric butt welding process, while the other is made by the fusion type of weld in which a piece of Stellite is welded on the



Two Recently Developed Tools Made by Electrically Welding a Piece of Stellite or High-Speed Steel to an Ordinary Steel Shank by the Butt or Fusion Process

end of the shank by the electric fusion process and the nose of the tool is supported by the heel, which is in line with the base. In making the cutters for both tools the Stellite is cut off with the grain, which, it is pointed out, enables full use of the outside cutting edge to be secured. This, it is stated, has proved more effective than the center of the material. In sharpening the tool it is only necessary to grind the top, all clearances being assured by the angles of the tool.

Every shape of tool can be welded so that lathes, boring mills and planing, cutting-off, screw and milling machines can be equipped with these new tools. The Stellite tools can be supplied in three grades and in four stages, viz.: welded, welded and rough ground, welded, ground and heat treated and in a finished tool ground to form ready for use. If desired special shapes can be welded for customers, which enables short pieces of high-speed steel or Stellite to be entirely used.

Five courses for shop men have been announced by the Shepard Electric Crane & Hoist Company, Montrour Falls, N. Y., including blue print reading and shop sketching, mechanical drawing, mathematics, mechanics and practical electricity. The company assumes all expenses except for implements which will be provided at cost.

An amendment to the San Francisco charter, prohibiting picketing, appears to have been adopted at the recent election by about 3000 majority. The amendment was fathered by the Law and Order Committee of the Chamber of Commerce.

Employing Men for the Steel Mill*

The Methods Followed by the Illinois Steel Company in Hiring, Keeping Records of and Discharging Men

BY A. H. YOUNG†

The employment bureau of to-day has responsibilities far outweighing the mere supplying of labor and maintenance of service records—when properly functioning it will provide an employee peculiarly fitted for each of varying occupations served; it will discover the worker not fitted for his task, and, having done so, will find the task fitted for the worker. Not only must job and man harmonize, but also must it be assured there will be no discord when *many* men are fitted to a single task. Thus, Turk, Serb, Greek, Croat, Dalmatian, Montenegrin, Russian, or Pole may each be found desirable as laborers in a blast furnace plant; but a wise employment agent will not try to blend them all into one "gang" lest the accident rate rise.

The mere maintenance of an adequate service record—the most elementary function of an employment office—is in itself a peculiar service. It demands that every change of occupation, every promotion, every disciplinary act or especially meritorious service, be recorded consecutively, and be quickly available on demand.

So, too, when an employee leaves the service, must the true cause of his action be made a matter of record, and on this point alone can the competent employment agent make himself a most valuable factor in conserving desirable, experienced workers to the plant. Except for his vigilance, foremen may improperly exercise the power of discharge, or unfair conditions, easily adjusted, cause an employee to resign.

SUPERINTENDENT MUST HAVE ABILITY

First of all, the superintendent of employment must be a keen student of human nature, quick to judge the faker, and patient in uncovering ambition from beneath the immigrant's cloak of ignorance and awkwardness. An adequate force of interpreters and clerks, housed in an office containing a large and attractive waiting-room, are necessary to properly care for the details of office routine. The superintendent should be free to spend all of his time on the larger responsibilities of the office, unfettered by clerical duties. He must not only be aware of the location of all the groups of foreign settlements in the community, but he must become personally acquainted with the individual boarding bosses, steamship agents, clergymen, and other influential agents with whom the immigrant maintains a close contact. These are his supply depots, and only by perpetual, personal reconnoitering can he remain familiar with the quality and quantity of available applicants.

No less exacting is the duty of keeping closely in touch with all the foremen in the plant which he serves. A proper distribution of new employees requires the agent to know the varying character of the duties of each job in each department, and the more marked idiosyncrasies of foremen and superintendents. He must know the ability of foremen and gang leaders to speak foreign languages and be familiar with the seeming ineradicable racial antipathies and factional disturbances of the polyglot stream of humanity which passes through his department.

In the most progressive of our modern business organizations the manager of the employment department is given very extensive and final authority. In hiring laborers and men for occupations of relatively minor importance he passes final judgment on the applicant's fitness and hires or rejects him directly. In other cases he retains jurisdiction as to eligibility in all details,

except as to skill, and passes the applicant on to the foreman or superintendent for judgment as to this latter trait. If found acceptable he is returned to the bureau and required to furnish references before being hired.

Physical examination of employees is properly another item of employment detail. The results should be on file with service record of the employee. Usually the complete report of the physical examination is kept in the surgeon's files, and only a grade symbol used in the employment office. Thus, instead of filing the complete test report, a small card is prepared, giving date of physical test, surgeon's file number, and a symbol—A, B, C, or D.

"A" indicates that the applicant passed all tests satisfactorily, is fit for any class of employment and has no permanent disabilities.

"B" indicates the same as "A," except that some permanent disability is possessed, such as a scar, a missing toe, or stiff joint. The value of this classification is found when the files are consulted in connection with personal injury settlements, as they prevent the collection of compensation for disabilities falsely claimed as the result of an accident subsequent to employment.

"C" indicates that the applicant has disabilities which may prohibit his employment at certain occupations. Whenever this classification is assigned the employment manager is required to obtain the approval of the surgical department for the particular job involved, and cannot subsequently transfer the employee to another department or change his occupation without such approval. Should a department head assign new duties to such an employee the change immediately comes to the notice of the employment office through the payroll department, which is required to send a copy of alterations of occupation to the bureau, and miscarriage of the plan is thus corrected.

"D" signifies complete disqualification in the case of a new applicant and a very special consideration of all relative facts when assigned to a present employee.

EMPLOYMENT ROUTINE

The first routine of the employment office, following the acceptance of the applicant after physical examination, is the preparation of the "service record" card. This is usually about 5 x 7 in. and on one face is entered the employee's full name and address and personal signature. Provision is also made for the name and address of the person to be notified in case of sickness or accident. The balance of that side of the card is ruled off for entering the date and cause of beginning and ending service in each occupation. Causes may be coded, thus: "T" transferred; "Q" quit; "D," discharged; "C" commenced; "R," re-employed; a complete entry reading, say, "C-7-21-15-Trans-Switchman-8-14-16-T T-8-14-16-No. 1 R. M.-Craneman." Each successive pay roll number is recorded on the card as soon as issued.

On the reverse of the card is entered: Country of birth and race of the employee and same of parents; number of years in this country (if foreign-born); whether or not naturalized; whether married or single; number of children and whether or not family is in this country; age; ability to talk, read and write English, and read or write native language.

A "register" number is assigned to each card in the "live" file. This is a permanent number and does not change with shifts in occupations or employment. Each new employee is assigned the next consecutive number. An ex-employee returning retains his old number.

*From a paper presented at the annual congress of the National Safety Council at Detroit, Oct. 19.

†Supervisor of Labor and Safety, Illinois Steel Company, South Works, South Chicago, Ill.

The complete record card can be prepared in less than two minutes by our experienced interpreter, who then makes out an employment slip which is given to the man. This shows his name, register number, occupation, and the name of the foreman to whom he is to report. He is also given a book of rules in his native language and personally conducted by a uniformed patrolman to his new foreman. On the way the patrolman takes him to the clock house and shows him how to ring in and out, then to the locker and wash room, so that he may be familiar with the sanitary equipment of the plant. He is also carefully directed over the proper route to follow to and from the gate nearest his department.

The employment slip given to the man is taken up by the timekeeper, who has it signed by the superintendent of the department. He then uses it as the basis of his time-book entries and marks a pay roll number on it. Then it goes to the addressing machines to be entered on the printed pay rolls, and is returned to the employment office with a proof of the typed pay roll entry. Much care is given to correctly spelling each name and checking the final typesetting, as the substitution of an "i" for an "e" would practically lose a name in the files.

An employment slip issued and entered in this manner is the only authority recognized for placing a name on the pay rolls. Periodically, the complete pay rolls are checked against the "live" files, with which they must exactly coincide.

TRANSFER OF EMPLOYEE

Should an employee desire to transfer from one department to another, he is required to obtain the written consent of his superintendent on a special form. This is presented to his prospective new superintendent, and, if approved, is honored at the employment office as an order to transfer and the records changed accordingly.

Every encouragement is offered to employees to freely consult the employment agent on all questions affecting his relations with the company or for advice on other matters. These items are treated in absolute confidence by the labor department, and if complaint is made of improper conditions or equipment, or wrong acts of foremen, a full investigation is promptly made and followed through to a proper adjustment.

RECORDS KEPT UP TO DATE

From time to time the service record of the employee is corrected by a history of his negligence or diligence, as the case may be. For instance, a monthly report is submitted by each department, showing the reprimands or lay-offs administered during the month, with the circumstances attendant thereto. This report is abstracted and filed in the envelope containing the record card. When an employee is injured that fact is entered in like manner, showing date, casualty department file number, and classification as to responsibility for the accident. If another similar entry is made on the same card the details of the cases are at once made known to the head of the safety department, who may thus be put on the trail of an habitually careless workman. This particular item of coöperation between employment and safety divisions has proven of real value. It does not follow that an employee twice injured through carelessness is removed from service, but it has been found advisable to shift an awkward workman from billet loader to caretaker. In two cases it revealed defective eyesight in men occupying hazardous positions, who had grown old in service. The very knowledge that he will be quizzed about recurring accidents is a stimulus to the worker to avoid them.

DISMISSALS AND QUITTING.

Every practicable inducement is offered to retain an employee in the service, and the matter of issuing a pay-off slip, either because of resignation or dismissal, is especially scrutinized. These pay-off slips are made in sheets perforated in three sections and padded in book form and issued to superintendents.

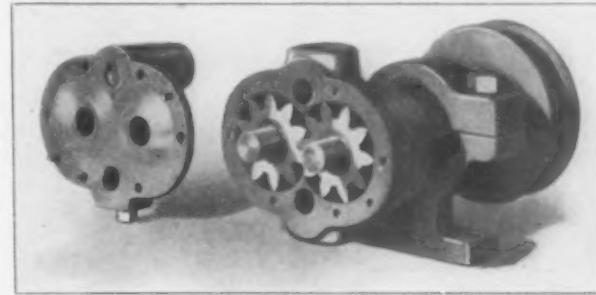
The top section is the stub retained by the department head, and records such data as he may wish. The

second, or middle section, is required to be sent promptly to the labor department, and gives name, pay roll number, and the true cause for leaving the service. The third, or bottom section, is an order on the accounting department to pay off the employee. This he is required to bring in person to the employment office, where record is made on his service card, which is then transferred to the "dead" file. He is courteously asked his reasons for leaving, and an attempt is made to get an expression of his view of employment with the company.

The head of the labor department has authority to review all cases of discharge, and if, after full investigation, he does not feel satisfied that the best interests of the company are served by the dismissal of the employee, he reinstates him—usually by transfer to some other department. Likewise, if a man quits because of peculiar conditions in one mill which are not present in another a transfer is suggested.

Rotary Machine-Tool Lubricating Pump

The Goulds Mfg. Company, Seneca Falls, N. Y., has developed a line of rotary pumps for supplying cutting compounds and oils to metal working machines. The pumps are built in two styles, one of which is reversible and the other non-reversible. The first is



A Recently Developed Oil Pump for Lubricating Machine Tools with the Cover Removed to Show the Cams That Handle the Oil or Cutting Compound and the By-Pass Arrangement Used to Prevent the Building Up of Excessive Pressures

adapted for screw and automatic machines in which the direction of rotation is reversed, while the other is suitable for gear cutting and chucking machines and in general for any machine tool operating in one direction only. Two different arrangements for mounting the pumps are provided, both being capable of swiveling around the pump through a complete circle. This feature, it is pointed out, enables the pump to be located on practically any style of machine tool.

As will be noted from the accompanying engravings, the pump operates by the rotation of two metal cams, which are generated on a gear shaping machine and mesh or roll together. The toes of these cams engage closely and fit the case snugly, it is emphasized, thus reducing the amount of slip considerably. The accuracy with which the case and the cams are machined, it is pointed out, gives a high vacuum and it is possible to operate the pump on high suction lifts.

A constant, steady flow of oil or compound is supplied by the pump and the demand on the driver for power does not fluctuate. Practically any of the ordinary methods of drive can be employed, and the driver can be either belt or direct-connected, as may be desired.

Both styles of pump are equipped with a relief valve and by-pass built in the cover, emphasis being laid upon the fact that they are part of the pump and not accessories. This feature, it is explained, enables the operator to control the amount of oil or cutting compound being handled, and also protects the pump against any excess pressure that might be built up as the result of the oil pipe or valve closing.

The pumps are built in two styles, one having a capacity of from $1\frac{1}{2}$ to 4 gal. per min., while the other will pump from 4 to 10 gal. Both of the pumps are regularly furnished with a single tight pulley for belt drive.

SAFETY AROUND COKE OVENS*

Mechanical Safeguards and Careful Selection of Men and Education the Necessities

The Government Bureau of Mines has issued a report on "Coke Oven Accidents" in the United States during the year 1915. The liability for injury at coke plants is not great. Outside of the shops there is comparatively little moving machinery connected with coke oven operations. For this reason, it may be, that at some plants when they have installed the usual mechanical safeguards they have been inclined to think that they have done all that is required. There perhaps has been a tendency to consider that, as it is essentially a hand-labor operation, the safety of the workmen depends entirely on themselves.

In order to be assured of a knowledge of causes of injuries, the writer has made an analysis of the records of his own plant. As it employs between eight and nine hundred men and has a by-product department, including the recovery of benzol, it is safe to assume that a statement of the causes of injuries at this plant is fairly indicative of the causes of accidents at all by-product plants.

ACCIDENT RECORD

The analysis developed that, of the total number of accidents, the percentage of causes was as follows:

	Per Cent
Hand Labor:	
About the ovens	17.47
About shops	7.23
About coal handling department	4.82
About by-product department	3.61
About coke handling department	2.41
Burns:	
Steam and hot water	7.83
About charging holes	4.21
Electricity	2.41
Hot tar, lime, etc.	1.80
Stand pipes and dampers	1.80
Acid	1.80
About doors of ovens	1.20
Falls:	
Slipping or tripping (ground level)	7.83
Slipping or tripping (above ground)	6.02
From ladders, scaffolds, etc.	2.41
Into unprotected holes	0.60
Particles in the Eye:	
From wind	11.44
From tools or work	0.60
Machinery:	
About batteries	3.01
About by-products department	2.41
About shops	1.21
Railroad: About engines or cars	2.41
Falling material	0.60
Miscellaneous	4.82

Hand labor accidents head the list. Hand-labor accidents are virtually all due to carelessness. A large percentage of injuries were burns of one kind or another. This is to be expected, of course, but investigation showed, that practically every injury due to burns would have been prevented by proper care. In fact, with the exception of the injuries to eyes due to flying particles, at least 90 per cent of the accidents were due to lack of care on the part of the injured workmen or to careless acts of others. In this connection, it is proper to state that our plant has been active in its efforts to make conditions as safe as possible. It is a possible explanation of the fact that the statement of causes shows a low percentage of accidents due to machinery.

A few of the provisions for safety at this plant are as follows: At the coal unloading station derails are installed to prevent bumping cars on which unloading crews are working. As it is necessary for men at times to poke down the coal in the cars, steel platforms are provided at the sides of the tracks from which much of this work can be done and which furnish a safe and easy way for men to get onto and into cars. Cables are stretched across the hoppers. As the cables are not rigid, they allow the coal to pass through readily and at the same time accomplish their purpose of preventing men from falling into the hoppers. Wrenches for use in opening the

*From a paper presented to the annual congress of the National Safety Council at Detroit, Oct. 20, by Kenneth M. Burr, safety inspector, Illinois Steel Company, Gary, Ind.

doors of the hopper cars are so made that if, when the ratchet dog is released and the pressure of coal upon the doors causes the shaft to spin, the wrench will automatically release. Open lights are not allowed in the crusher buildings or in the coal conveyor enclosures. Provision is made by which, at any of a number of convenient places, the snapping of an electric switch will at once stop the conveyor. On the ovens the larry cars are equipped with fenders and automatic bells. The operator's cab is located so that he always has an unobstructed view ahead. The chutes on the cars are so constructed that, when charging, a hinged extension swings into place. This reduces to a minimum the amount of coal spilled around the charging hole. The lid men wear leggings, use a long-handled hook for removing lids, a long-handled broom for sweeping spilled coal into the ovens, and are, of course, instructed to work always on the *windward* side of the hole. The walks on both the pusher side and the coke side are wide. The coke is not quenched at the ovens but is taken in transfer cars to a quenching station, removed from the ovens. The quenching station structure is so enclosed that the steam is carried upward. This reduces the possibility of accidents due to steam-obstructed vision.

MECHANICAL SAFEGUARDS EXCELLENT

Of course, these are but a few of the mechanical safeguards which are in addition to the stairways, walks, railings, gear guards, and other conventional safety provisions.

As it is shown that coke-oven accidents are not due to lack of physical protection, the conclusion is obvious that men employed in coke-oven operations must be very careless. The reason for this must be one of two things: Either it is because of labor conditions or because of a lack of proper education.

The work about the ovens is mostly of a routine nature. It does not require especial training or skill. Therefore a large percentage of unskilled labor is employed. The work is dirty, and about the ovens it is hot and unpleasant, especially in the summer months. Largely, as a result of these conditions, the percentage of change in operating forces is high. Accident rates are always high when and where there is a high percentage of new men. Safety in coke-oven operations, then, must begin with the employment of the men. Care in the selection of men can be made a great factor in assuring permanent forces.

Of course, the plants should be made safe along the lines of mechanical safeguards and safe working conditions. At the same time it is impossible to give too much attention to working conditions that affect the welfare and comfort of the men. As a suggestion along these lines I would call attention to the excessive heat on top of the ovens. It comes largely from the standpipes. It would be well to insulate them so that the amount of heat radiated will be reduced to a minimum. Water closets, urinals, wash and locker rooms and shower baths should be provided. They should be convenient, light and well ventilated, and above all things, should be kept clean. The mere providing of sanitary equipment is not sufficient—the equipment should be maintained in a manner to make it attractive and inviting. In short, one of the best ways to assure a permanent force is to make conditions as comfortable and attractive as possible.

Above all things, every effort should be exerted to educate the workmen into habits of caution. It is indispensable that every workman should be carefully instructed by his foreman regarding his work and the dangers attached to it. It is particularly necessary that the foreman should give complete instructions in safety to the non-English speaking workman, and that he take pains to be sure that the man fully understands and appreciates what has been told. He should insist that each man under him does his work as he has been instructed to do it. He should be held responsible for each accident that occurs to them and should thoroughly understand that he will be called upon to explain it. An effective means of education is that afforded by safety committees. But the fact that safety committees are active should under-

no circumstances be permitted to allow the foreman to forget his personal responsibility.

The most important function of the safety committee is to impress upon each man that he must be careful at all times, that he must think and act safety. I believe that the most good can be secured by meetings held with groups of workmen. There cannot be too many of these meetings. I think that it is highly important that written reports be made of each meeting. From these written reports much information is gotten which is of value to others.

PERSONAL WORK OF SUPERINTENDENT

The operating head of the plant must put all the power of his position and all the force of his personality behind the demand for accident prevention. If he is inclined to delegate safety matters to others and is not willing to take an active personal interest in it, the results are sure to be disappointing. He must impress upon his entire organization that he is sincere in his interest and that he will rigidly discipline those who fail to do their full duty in matters regarding safety.

Education in safety naturally begins with telling men of things to be avoided, with instructions as to the safe way of working. But there is a broader field for this work. It is the duty of those who, either by endowment of nature or through better opportunities of education or training, have superior reasoning powers, to teach those less fortunate to think for themselves—to do their best to get them to exercise their own powers of observation and to encourage them to develop and use their own reasoning powers. It is a duty they owe to themselves and to their fellow man.

Safety in coke-oven operations calls for mechanical safeguarding, safe methods, care in the selection of workmen, agreeable surroundings, capable foremen, and above all things—education.

German High Speed Steel

Good high speed steel for lathe tools may have the following composition, according to the German journal, *Elektrotechnische Rundschau*:

	Per Cent		Per Cent
Carbon	0.45 to 0.85	Chromium	2.50 to 6.50
Silicon	Trace to 0.20	Molybdenum	None to 2.50
Manganese	0.10 to 0.50	Vanadium	None to 1.50
Tungsten	8.00 to 18.00	Cobalt	None to 5.00

Wide variations in these proportions make possible a large number of steels, rendering selection difficult. Such steels must be forged at temperatures not less than 1000 deg. C., or cracks will be formed which though invisible will lead to fracture in hardening. Annealing is effected by prolonged heating at 800 deg. C. According to the composition and intended application of the steel, it may be hardened at temperatures between zero and 700 deg., an oil bath being used for temperatures up to 300 deg., beyond which it should be replaced by one of molten lead, or preferably barium chloride solution maintained at uniform temperature by the passage of low-tension electric current. Large tools must be heated to 800 deg. before being plunged into the bath. This treatment sometimes causes the formation of a superficial layer of low resistance, through the action of the liberated chlorine on the carbon of the steel, and not, as formerly supposed, through the oxidizing effect of an adherent film of air. To prevent this defect it is proposed to immerse the tool first in a saline bath of lower temperature in order to moisten the surface thoroughly.

A recreation association, known as the Simplex Recreation League, has been organized by the directors of the Simplex Automobile Company, New Brunswick, N. J., for the benefit of its employees and their families. The old Middlesex Club house in Highland Park has been acquired and renovated, providing an attractive community house for the organization. In addition to its use as a social center, it will also be the headquarters of the employees' athletic teams.

Portable Electric Drills for Tapping Blast Furnaces

Several devices are in use for the tapping of blast and other furnaces, these including the electric arc, the oxy-acetylene flame and the portable electric drill. Some of the large blast-furnace companies of the country have adopted the last named method and find it quick and economical. The drill is allowed to penetrate to within an inch or two of the iron and tapping is completed as usual with a long steel bar. About five minutes is required for tapping in this way, actual drilling time being about two minutes.

The drills used are 10 ft. long with about 3 ft. twisted, the diameter of the drill being 2½ in. The adaptability of such drills to this class of work rests in the fact that they are of sufficient power to drill 2½-in. holes without any chance of stalling. The switch is located at the end of the long handle and the



The Van Dorn Portable Electric Drill As It Appears When Used in Tapping a Blast Furnace

operator, in letting go of the handle, instantly cuts off the power and the drill swings to one side.

The Van Dorn Electric Tool Company, Cleveland, Ohio, has designed a drill for tapping blast furnaces, known as Type D-C-5. The illustration shows one of these tools in operation.

A Four-Plunger Horizontal Hydraulic Pump

The Hydraulic Press Mfg. Company, Mount Gilead, Ohio, has added a horizontal four-plunger type to its line of high-pressure hydraulic pumps. It is designed to supply a large volume of water or other fluid against a high pressure and may be equipped with 16 different sizes of plungers ranging from 1½ to 5 in. in diameter, the difference between the successive sizes of plunger being ¼ in. The pressures range from 700 to 9500 lb. per square inch and the water capacity from 326 to 24 gal. per minute. The pump is driven by a 150-hp. motor through either spur or herringbone reduction gearing to reduce motor speeds of 450 to 750 r.p.m. to 60 r.p.m., which is the speed of the pump crankshaft. The stroke of the plunger is 16 in. The floor space occupied is approximately 7 x 19 ft.

Because of the stoppage of tin imports, Germany is reported to have prohibited the use of solder containing more than 30 per cent of tin and the tin so used must have been recovered from dross or scrap. The making of soldered joints has to be restricted to cases where lapping, riveting and electric or autogenous welding are impracticable. It is stated that a usable solder can be prepared from 10 parts of tin, 80 of lead and 10 of cadmium. Although the cadmium is three times as expensive as tin, the extra cost is considered of no consequence because of the necessity of using sufficient tin as raw material.

Handling Iron and Steel Export Shipments

Manufacturers Now Largely Working Through Outside Selling and Shipping Organizations— How Problems of War Time Have Been Met

BY F. A. KELLY*

A good many American manufacturers, by reason of the extent to which their output has been absorbed by domestic consumers and the difficulties, real or otherwise, in making deliveries abroad, have been content either not to look for extension of their trade in other countries or to curtail their direct reach and leave shipping details to export houses or to export foreign freight forwarders. Lately such concerns have had their attention more strongly directed to the foreign field, not only by the demand from abroad, but by the concerted effort of those who would make clear the desirability of increasing exports so that the nation may take its rightful place in the world's commerce.

In view of the intricacies of shipping to foreign countries, especially since the war started, it is not strange that manufacturers, aside from the very few that do a large business abroad and therefore find it advisable to maintain export shipping departments, should not want to carry transactions further than the seaboard, securing payment for their goods on delivery alongside ship. Since the war started important new organizations have been formed specifically for selling American goods abroad, buying them on a domestic basis, thereby relieving the maker of all the details of customs tariffs in the purchasing countries, constantly changing freight rates, marine and war insurance, steamship sailings, consular invoices, lighterage, trucking, etc.

STEEL BUSINESS MUST BE SOUGHT LATER

A peculiarity of the present abnormal condition is that steel export sales are largely made without solicitation, with the demand coming faster than the mills can handle it. After the war it will be another story, and sellers will have to solicit if they would have the business. This would mean the maintenance of efficient selling and service forces to meet shipping expenses, and a large business would be necessary.

Therefore as a rule producers of iron and steel in the United States will find it an advantage to use organizations which with capable agents are qualified to distribute throughout the world, disposing of surplus steel stock at a time when export sales will be especially desirable. In normal times, even large steel companies are not inclined to reserve a stipulated tonnage for foreign markets that would justify the maintenance of an export department with its heavy overhead, largely contributed to by foreign representatives, heavy traveling expenses, cable tolls, etc. Another point is that no one mill makes the variety of products, with one or two exceptions, that might be embraced in one foreign inquiry. Again, their attention to the foreign markets, for reasons stated, is likely to be spasmodic.

Manufacturers who are shipping through one or another of the agencies referred to will find interesting some of the conditions affecting export shipments, particularly of iron and steel. Incidentally

it may be remarked that conditions have greatly multiplied the number of freight brokers who handle exports, many of whom are doing a profitable business and will remain in the field, while others will disappear as conditions become normal.

Sales abroad are usually subject to c.i.f. terms (cost, insurance and freight). Legally a quotation for export might be construed as including both forms of insurance—the ordinary marine risk, on which the rates are stationary, and the war risk, on which rates fluctuate and are governed by conditions at the time a steamer is loading. A little submarine activity in any territory will send the rate for that zone skyward, as was illustrated by a recent Mediterranean operation which caused the war risk premium to advance to 10 per cent and over. That means a cost of \$10 per ton or more, a very appreciable item. Shippers generally are excluding the war risk cost in their delivered quotations, which adds it to the price the buyer has to pay for his delivery. Buyers are recognizing the justice of this course since the actual cost cannot be predetermined when sales are made three and four months in advance of shipment.

GREAT BRITAIN'S LETTERS OF ASSURANCE

Shipments to all Scandinavian ports and to Holland are subject to the supervision of the British Embassy Trade Department, Washington, D. C., which grants, on satisfactory statements by the shipper, what are called letters of assurance. These so-called letters are not a guarantee that the goods shipped will reach their destination, or not be interfered with en route, but are an evidence that Great Britain is satisfied of the good faith of the shipper and that none of the shipment is intended for Great Britain's enemies. The shipper must be of recognized standing and the name of the ultimate consignee given. Russia has somewhat similar regulations. The British Government some time ago placed an embargo on the export of wire to Greece, evidently because of fear that it might reach one of the Central powers, but recently this restriction was modified.

Structural shapes have not been regarded as attractive freight, particularly by the regular steamship lines, because of their length and wastage of space, and when a line has its choice of freight it usually penalizes shapes. Plates and bars are regarded more favorably because they permit of close stowing. The greater density and uniformity in size of billets, ingots, slabs and pig iron make them desirable as freight, but copper is frequently given preference over any of these.

The freight rates to England on plates, shapes and bars range from \$14 to \$25 per ton, the spread resulting from the character of cargo a vessel is taking and the degree to which it needs compact heavy cargo. Incidentally, it is to be remembered that loading and trimming a ship with a miscellaneous cargo which fills her to the water line and uses the space correctly is a science calling for careful figuring and judgment. Measurement cargo, or

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that which is bulky, and dead-weight cargo, or that which is dense and compact, have to be carefully considered. A ship would not be entirely loaded with cotton, for instance, nor with tobacco nor with machinery, as her weight capacity would not then be utilized and she would not sink to the water line, technically known as the Plimsoll line.

RATES ON FINISHED PRODUCTS AND PIG IRON

On plates, shapes and bars the freight to France is \$15 to \$20 per ton, and to Italy \$25 to \$40 per ton. The rates to Italy have been made higher by reason of the congestion in the ports of that country. With a steamer worth \$3000 or \$4000 per day, it can readily be seen that any unnecessary detention is expensive both to the ship owners and to shippers. The rates to Sweden are high, running up to \$45 and \$50 per ton. The cheapest freight on heavy cargo is often secured from South Atlantic or Gulf ports, unless tramp steamers that need freight are loading in the north. As an indication of the need of carefully scrutinizing the available cargo space it may be said that quite recently there were ten steamers between Norfolk and Boston which would take on iron and steel products for Europe at about \$14 per ton, whereas the regular lines wanted \$25 and over.

Pig iron fills 10 cu. ft. to the ton. On this product the following line rates were effective around Nov. 1:

To Italy, from North Atlantic and Gulf ports, \$30 per gross ton, minimum, with some lines asking \$33.

To England, \$1 per 100 lb. was the minimum.

To French ports, Havre, Marseilles and Bordeau, \$22.50 to \$25.

To Gothenburg, Sweden, \$33 per ton, and possibly \$30 on a good-sized tonnage.

To Holland, about \$32 per ton.

Very little freight room is available for Italy, Liverpool or Sweden, but a fair tonnage for France is in the market. The rates to Holland are up \$7 to \$10 a ton as compared with those of a few weeks ago; those to Gothenburg are about the same as one month ago, and the French rates have been the same for the past two months. Those to Italy were as low as \$25 a short time ago.

Most of the pig-iron shippers employ foreign freight forwarders, and naturally employ only one on a shipment, for the reason that if several were looking for the space required by one consignment they would be bidding against each other for the same space.

RAILROAD CONGESTION PUZZLES FOREIGN BUYERS

The railroad situation at Atlantic ports and in the interior is something the foreign buyer does not comprehend, and representatives have been sent over here to "clean it up." But a little insight into the actual conditions which prevailed last winter and spring caused the foreign representatives to change their minds, and the reports they sent home prompted a little more patience on the part of their principals.

For the approaching winter a car shortage has already begun and it will have an important effect on export as well as domestic shipments. The railroads have begun to clean house by placing some ports under embargo, thereby relieving the lines and the terminals, so that they can better care for the business which is in prospect—an action which is based on wise foresight, even if it brings temporary inconvenience to shippers. The situation later on would be far worse if a car accumulation at the seaports should seriously impair all operations when bad weather sets in, as happened last winter.

A Year of War in the French Steel Trade

A conspicuous statement in the report of Joseph G. Butler, Jr., on "The French Industry in War Time," published in THE IRON AGE, Nov. 2, 1916, was this:

In spite of the fact that at the beginning of trench warfare France had lost behind the German line 80 per cent of her normal pig-iron manufacture and 70 per cent of her steel production, it has been possible by the utilization of lower grade ore in other districts of France and which were not exploited to any extent previously, to increase the steel production of the country 100 per cent over that of last year.

The report of the Comité des Forges de France for the fiscal year 1915-16 contains some interesting data in line with the above. The Comité, in agreement with the Chambre Syndicale du Material de Guerre, has not only assisted in the development of its own members, but has also sought out all others who, while not being constituents of the association, were yet capable of taking an important part in the production of material and munitions. The results have been so favorable that at present the output of shells meets all requirements and has for months past. The manufacture of shells of large calibre, a task more difficult than the making of smaller ones, is developing excellently.

The large iron and steel plants have undertaken extensions and established new branches and equipment which previously would have required years of time. The making of small arms, also organized by the Comité, has surpassed expectations.

The lack of supplies of steel is pointed out as one of the early difficulties. When the war broke out certain blast furnaces and open-hearth furnaces in non-invaded territory had been shut down for various reasons and had not been restarted in May, 1915. Since then, however, the Comité has not only endeavored to get such plants operating again, but has tried to establish new plants. The result has been that the production of steel has been doubled in 12 months.

To insure a supply of raw materials a common organization has been established, with service organized in Paris and England for the supply of refractory materials, ordinary and special quantities of pig iron and iron and steel products which it seemed best not to ask French makers to furnish. The needs of private consumers have had to be neglected as works cannot deliver iron and steel without the government's permission.

A suspension of import duties had been suggested as a remedy for procuring iron and steel, but the Comité opposes this and claims it has not considered any narrow or immediate interests. As all production was ear-marked in advance for war purposes, a temporary abolition of duties would not bring about an increase of a ton in output, but would merely be for the profit of the foreign seller and a detriment to the French treasury.

After the war a recasting of the tariff will be one of the first questions, says the report, for the purpose of procuring for the state much needed resources as well as assuring a vigorous development to the national industry and protecting it from unfair competition from Germany.

The professional re-education of those incapacitated by the war has had the active attention of the Comité. The labor crises due to the war have made it necessary to organize workshops for instructing men. In conjunction with coal owners, the engineering, textile, sugar and distilling works in the invaded districts, the Comité has formed an association to attend to the reconstruction of plant and stocks in those districts and to devise means to set the plants in operation quickly.

At a meeting of the Executive Committee of the Associated Advertising Clubs of the World, presided over by President Herbert S. Houston, in St. Louis, Oct. 31, the date for the annual convention of 1917 was fixed for June 3 to 7, inclusive. Arrangements were completed for the opening session of the convention to be held at Washington University, while the departmental sessions will be held in the Municipal Courts building and at other points in the down-town section of the city.

A Turret Lathe for Boring Shells

A turret lathe designed especially for boring the inside of 4 to 8 in. high-explosive shells has been built by the Reliance Machine Company, Toronto, Ontario, Canada. The lathe is massive in construction, the bed, legs and lower headstock bearings being cast in one piece. This design, it is emphasized, provides a rigid machine and one that will stand up under the heavy cuts and feeds required for rapid and continuous production.

The front headstock bearing has been made large, being 8½ in. in diameter and 12 in. long. This bear-

steel ring, tempered and ground and having a hardened steel key fitted into it, is used to hold the turret in any desired position. The clamp on the top of the turret is heavy, the stud having a diameter of 1½ in. The weight of the complete lathe, including this equipment, is 8000 lb.

Pressure Oil Film Lubrication

The advantages of pressure oil film lubrication were discussed in a paper by H. B. Newbiggin at the meeting of the British Association at Newcastle-upon-Tyne, Sept. 7. The following is a condensed abstract of the paper.

A lubricant alters the nature of the rubbing surfaces, thereby reducing friction, and it also, under favorable conditions, generates a high pressure oil film between the surfaces, entirely eliminating metallic contact and enormously reducing the friction. This latter action is known as pressure oil film lubrication. It occurs to a limited extent in most journal bearings, but is absent in ordinary collar thrust bearings.

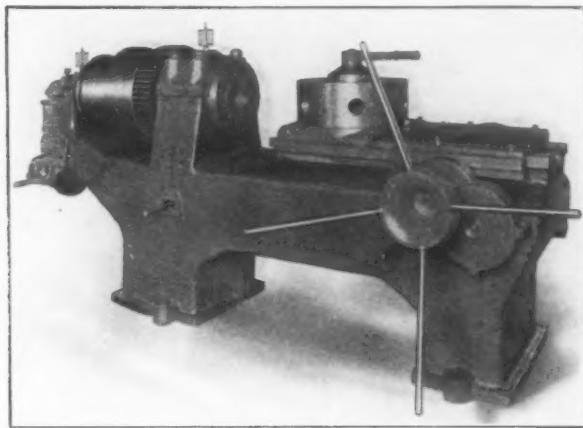
It has been shown by A. G. M. Michell of Melbourne, Australia, that a rectangular block, pivoted at its point of resultant pressure, will automatically assume an angle to an opposing lubricated surface, this depending on the speed of rubbing, viscosity of the oil and the pressure. On this principle was founded the now well-known Michell thrust bearings, the essential feature of which is the subdivision of the stationary surface into a number of blocks or pads, each pivoted at its back and free to assume a slight angle with the contracting surface. The bearing has a single collar, in contradistinction to the multiplicity of collars in the older type of thrust bearing, which were made necessary by the low carrying capacity of parallel rubbing surfaces, compared to the high capacity of those where the surface is subdivided and free to assume the angle with the opposing collar required for the formation of oil pressure within the film.

The Michell bearing automatically generates a pressure oil film between the surfaces, has a coefficient of friction of about 0.0015 as against 0.03 in the older type of bearing, and carries from 200 to 300 lb. per sq. in. pressure with a greater factor of safety than the primitive form has at 50 lb. per sq. in. pressure. Upward of 800 such bearings are running in Great Britain, the sizes varying from 1 to 15 in. diameter. They are rapidly becoming standard practice in steam turbine work. The same principle is now being applied to journal bearings.

Chipped Rolls Repaired by Arc Welding Process

A rather interesting repair of a roll used for producing special shapes of sheet steel piling, which had become chipped, was recently made by an electric arc welding set built by the Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. The application of this process has resulted in the saving of a number of rolls that had chipped out in service in this plant. In repairing the defective part with an electric arc welding outfit, the chipped portion is first filled in and welded, after which it is ground or filed to the proper shape. It is stated that after the work has been completed it is practically impossible to detect the point at which the weld has been made except by very close examination and the repairs are apparently permanent. The same company is also repairing worn wobblers and rebuilding broken teeth in gears and pinions in the same way.

A public hearing on the boiler code of the American Society of Mechanical Engineers is to be held on Friday afternoon, Dec. 8, at 2 o'clock in the Engineering Societies Building, 29 West Thirty-ninth Street, New York, continuing into Saturday and the next week if necessary. The hearing is held under a recommendation of the boiler code committee of the council of the society to the effect that revisions are to be made to the rules as the state of the art advances and that hearings for this purpose should be held at least once every two years.



The Bed, Legs and Lower Headstock Bearings of This Recently Developed Canadian Heavy Boring Turret Lathe for High-Explosive Shells Are All Cast in One Piece

ing, in common with the rear spindle bearing, is fitted with self-oiling rings. The spindle is made large enough for the bearing to take the shell completely inside and is made in one piece with the 15-in. heavy flange to which the chuck is bolted. The chuck is of the collet sleeve type and has three self-centering hardened steel jaws, which are relied upon to grip and drive the shell. The main driving gear measures 4½ in. across the face and the back gearing has a ratio of 9 to 1. The face width of the back gear, which is driven from a cone pinion of special electrical cast steel, is 3½ in. The cone pulley has two steps measuring 15 and 18 in. in diameter respectively, the steps being of sufficient width to take an 8-in. double belt. A special self-adjusting thrust bearing fitted with a dustproof, self-oiling cast-iron case and capable of a continuous working load of 8400 lb., is provided to take the thrust of the tool.

The carriage is 42 in. long and runs on flat shears each 3 in. wide. The power is applied by a steel rack 3 in. wide placed in the center of the carriage and this, together with the length of the carriage, is relied upon to prevent twisting and secure great accuracy. The center of the boring bar is only 6 in. above the shears, a feature which it is emphasized adds greatly to the stability of the turret. The feeds provided are four in number and range from 1/64 to 1/8 in. per revolution of the spindle, thus covering all roughing and finishing cuts. The feed gears do not have faces narrower than 1% and 19/16 in. and the worm gear on the power feed meshes with a steel worm having a ratio of 50 to 1, the thrust being taken up by ball bearings and transmitted to the frame. Hand feed is provided through a capstan wheel having bars 24 in. long. The gearing provides a thrust of 79 lb. on the tool for each pound applied to the capstan bars.

The turret, which is of heavy construction, is of circular design and measures 20 in. outside diameter. Six holes, 3 5/16 in. in diameter, are provided and are fitted with ½-in. square keys on the under side and two ½-in. set screws for holding the boring bars. Although a heavy central stem has been provided on the carriage, the turret is spigotted at its outer edge, which, it is pointed out, gives a wide base to resist the pressure of the tool. A hole through the center stem has been provided for driving out the boring bars. A hardened

THE PRESSURE ON SHIPYARDS

Marine Authority Estimates That Restoration Will Require Ten Years' Activity

Records compiled by *Marine Engineering*, New York, show that over 1,500,000 tons of vessels are under contract in American shipyards, comprising 198 freighters, 91 tankers, 12 passenger and freight steamships, 35 towboats, yachts, river boats and other small steam craft, 60 or more sailing vessels, most of them with auxiliary power, 150 or more car floats, barges, etc.; and contracts are sought for 100 or more vessels if shipbuilders can find the steel and launching ways. During the past 15 years the average tonnage built in American shipyards has been about 250,000. To be added to the activity in merchant ships is the Government naval program which calls for the building of over \$600,000,000 worth of war vessels in the next five years.

Manufacturers of navy-yard supplies and equipment have been requested, through *Marine Engineering*, to furnish information concerning their products to Commander Julio Dittborn, naval attaché, Chilean Embassy, Washington, D. C., whose government is planning to build a navy yard.

The Bethlehem Steel Company, South Bethlehem, Pa., has five steamships designed for its own use under construction at the Maryland Steel Company plant, Sparrows Point, Md., and its complete program calls for 25 vessels of about 17,000 gross tons each, for bringing ore from Chile, Cuba and other countries.

Those who attempt to foretell the length of time in which American shipyards will continue busy have steadily extended the period over which they believe the boom will last. A few months ago they were predicting two to five years, but now some of them believe that American yards will be filled with work nearly 10 years, basing their prediction on the destructive effects of the war and the rapid deterioration of commandeered and interned vessels. In its November issue the journal already referred to sums up the situation as follows:

EFFECT OF WAR ON MERCHANT TONNAGE

When the war broke out in August, 1914, the gross tonnage of the merchant marines of the world was approximately 50,000,000 tons.

Great Britain was credited with 21,045,049 tons. She has lost through destruction over 2,734,106 tons, leaving a balance of less than 18,310,943 tons. The government commandeered over 50 per cent of the larger and more efficient vessels. Counting these as about 9,000,000 tons, it leaves only about 9,000,000 tons of British merchant vessels still in commercial service. The government is running the ships for all they are worth, so that if the war lasts two years more the commandeered ships will be fit for little else than scrap, except at enormous expense for repairs. The 9,000,000 tons of vessels still in the ocean trade will be largely old vessels of comparatively small carrying capacity, and more or less uneconomical and inefficient.

Germany was credited with 5,134,720 tons. She has lost over 600,000 tons, leaving a balance of less than 4,534,720 gross tons interned. These ships are deteriorating at the rate of 15 to 20 per cent a year. Many of these are old vessels, so that this merchant marine will not be of much value at the end of two years more of war, except at enormous cost for repairs.

France began the war with 1,922,286 tons. She has lost over 309,023 tons, leaving a tonnage of something under 1,613,263. Like the other merchant marines, this one will require enormous expenditures to restore it.

The merchant marines of the other belligerents are correspondingly reduced in tonnage and efficiency.

At the outbreak of the war the United States was credited with 7,928,688 tons. Over 600,000 tons were added by foreign vessels coming under the American flag. Vessels under construction in shipyards to-day and those that have been delivered since the war broke out approximate 1,750,000 tons. American vessels lost

during the war aggregate 63,580 gross tons, making the total American merchant marine in commission and under contract at least 10,215,108 tons.

PRESENT STRENGTH OF WORLD'S MERCHANT MARINE

Up to date the belligerent merchant marines have been reduced in tons about as follows:

Total tonnage, August, 1914.....	50,000,000
Destroyed.....	5,000,000
Commandeered by British.....	9,000,000
Commandeered by other belligerents.....	3,000,000
Interned, Teuton Allies.....	4,400,000
	21,400,000
Total.....	28,400,000

Two more years of war must of necessity result in the destruction of considerable more tonnage.

What might be called the tonnage-efficiency of the 16,400,000 tons of commandeered and interned vessels will be enormously reduced and require very large expense to keep any of it from the scrap heap.

It is apparent that with two years more of war the world's merchant marines will be considerably under 25,000,000 tons, and in tonnage-efficiency much below the standard of Aug. 1, 1914.

How much new tonnage has been built outside of American shipyards since Aug. 1, 1914, is only conjectured, but it is undoubtedly very small. No one can even approximate the tonnage that will be built in the next year or two.

According to Capt. Robert Dollar, the shipyards of the world during the past 15 years have built approximately 2,500,000 tons per year. Accepting this as an average capacity of the shipyards of the world, it will be seen that it will require pretty nearly 10 years to bring the world's merchant fleets back to a sufficient tonnage to handle its commerce.

Addition to Adams-Bagnall Electric Factory

The Adams-Bagnall Electric Company, Cleveland, is completing an addition to its factory, consisting of a complete vitreous or porcelain enameling plant. The primary object of the addition is to improve further the quality and service of its Abolite line of porcelain enameled reflectors for industrial lighting, etc. The high grade of the porcelain enamel finish has always been an important feature of these reflectors, and with its own enameling plant, the company will be in position to strengthen this characteristic through personal factory supervision. It is understood that this company will be the only manufacturer of electrical apparatus manufacturing porcelain-enameled, steel reflectors complete in its own factory.

The enameling plant is being equipped for all classes of high grade vitreous enameling. A battery of four 12-ft. furnaces will be supplemented with a complete equipment of mixing vats, furnaces, drying ovens and handling apparatus capable of producing a large output and in charge of men with thorough experience in vitreous porcelain enameling. The equipment is new and of the latest design to secure uniform results. In addition to enameling all Abolites and associate equipment, the Adams-Bagnall plant will be capable of handling a considerable output of other vitreous enameling work. It will be in full operation before Jan. 1.

The Warren Steel Castings Company, St. Louis, has completed the installation of an electric furnace, the first in that city to be used in making castings. The furnace, which is of the Heroult type, is operated by power from the dam in the Mississippi River at Keokuk, Iowa. In installing the electric furnace, the company discards a crucible furnace which also was the first of its type to be installed in St. Louis.

A new form of file handle has been placed on the market by the Strong-Hold Mfg. Company, 307 Arch Street, Philadelphia, Pa. This handle is of the conventional wooden type with the material slotted at one end. The file end is inserted at this end, which is wire wound. This wire, which is in the form of a close coiled spring, causes the file end to be gripped securely, the slots giving free play to the coiled spring.

Crucible Steel Company's Report

Brief allusion was made last week to the appearance of the report of the Crucible Steel Company of America for the fiscal year ended Aug. 31, 1916. Following is a statement showing the disposition of net profits for the year:

Net profits	\$13,223,655.05
Cash dividends on preferred stock, 8½ per cent	2,125,000.00
Increase in current assets, in bills and accounts receivable in excess of bills and accounts payable, in inventories and in taxes and insurance unexpired, etc., \$19,775.14, less decrease in cash	10,060,288.66
Invested in additional property	2,879,680.77
Reduction of coal land purchase notes	307,000.00
Assets reserved for dividend scrip redemption fund	211,435.65
Deduct:	
Additional stock issued, 4216 shares of common	421,600.00
Decrease in investments and construction advances to associated companies	299,398.15
Increase in reserve funds	1,638,841.88
Balance carried to surplus	\$1,038,366.39

The condensed balance sheet, as of Aug. 31, 1916, is as follows:

<i>Assets</i>	
Real estate, plant, equipment, goodwill, trademarks, etc.	\$49,505,848.34
Investments in and construction advances to associated companies	9,157,972.67
Other investments	100,000.00
Scrip redemption fund assets	211,435.65
Cash in banks and on hand	1,161,920.35
Accounts receivable, less reserve	10,548,841.68
Bills receivable	45,860.35
Inventories	10,516,330.94
Taxes and insurance unexpired, etc.	77,242.69
Total	\$81,325,452.67
<i>Liabilities</i>	
Preferred stock	\$25,000,000.00
Common stock	25,000,000.00
Coal land purchase notes	309,000.00
Dividend scrip due June 30, 1920	1,637,404.00
Accounts payable, including advance payments on contracts	3,385,434.78
Bills payable	675,000.00
Accrued taxes and interest	314,079.95
Dividends on preferred stock payable Sept. 30, 1916	750,000.00
Reserves:	
Depreciation and renewal of plants	1,210,927.49
Contingent	500,000.00
Fire and marine insurance	500,000.00
Workmen's compensation insurance	500,000.00
Appropriated surplus:	
Invested in additions to property and working capital	15,000,000.00
Unappropriated surplus	6,543,606.45
Total	\$81,325,452.67

The Crucible Steel Company of America is guarantor of the principal and interest of \$7,470,000 five per cent bonds of associated companies.

At Aug. 31, 1916, the dividends undeclared on the preferred stock aggregate 23½ per cent.

From the accompanying remarks of Herbert Duy, chairman of the executive committee, the following extracts are taken:

"Crucibles, the backbone of our business, of which the company has a capacity for manufacturing 250,000 per annum, are necessarily used in connection with the production of all high grade steels. They are made from a mixture of German clays and plumbago, the latter known in the arts as graphite. During the present war, our supply of German clay has been entirely suspended. No new clays yet discovered produce a crucible as durable as that made from clay found in Germany. The character of the available supply reduces the life of the crucible to such an extent that it has tremendously increased the latter's cost. Plumbago has advanced in price over 200 per cent, which additional item, added to the reduced life and reduced output of a crucible, has made the production of our high grade steels cost very materially more than ever before. All

of our plants have been constantly short of crucibles, it requiring fully three times as many now to produce the same tonnage of steel as heretofore.

"To operate your plants under present pressure, of course, requires very largely increased working capital and increased outlay in raw materials. The conservatism displayed by the management in the matter of back dividend payments is due not alone to the company's extensive building program and the modernization of certain of its existing plants, but to this requirement of increased working capital as well. In the development of its business the company is spending several millions of dollars in the erection of new additions to its plants and improving those already built. Consequently, our statement must show large construction charges.

"The intention of your officials is to eliminate, as far as possible, the production of smoke from our city plants. To do this requires heavy expenditures of money for new boiler-plant units and for the necessary mechanical attachments to heating furnaces. Regardless of these heavy charges against income, progress is being steadily made, and in the course of a reasonable time the production of smoke should be practically at a minimum.

"Syracuse Crucible Works.—This large construction is now receiving considerable installation of machinery and during the coming year will begin to produce steel. This will require an expenditure of \$500,000. Gradually afterward, as demands require, additional machinery will be added, so that, when completed, this plant will, without exception, be the most modernly constructed crucible steel works in the world. Its power operations will be controlled entirely by electricity, steam only to be used for heating the buildings and for forging purposes.

"Sanderson Works.—Owing to the contracted space in which this plant is located, without opportunity to expand on its present site, recently, additional land in the outskirts of Syracuse has been secured, upon which it is intended to erect all future extensions to this works. Already several buildings have been erected and machinery is now being installed in them. The expenditure required to make a beginning will be in the neighborhood of \$500,000. Electricity will be solely used except for heating.

"Pittsburgh Crucible Steel Company.—The billet mill, for which contract was made in August, 1915, is expected to be completed before Dec. 31, 1916. Its installation will aid materially in helping the crucible steel plants secure an ample supply of steel billets. Contracts have been let for the construction of an addition to its open-hearth furnace building to accommodate two additional open-hearth furnaces, all of which should be completed during the coming spring. A large steel building for the production of castings required at the various plants of the Crucible Steel Company has been bought and will be speedily erected. Through its use, your company will be largely independent of outside foundries. Contracts for other large buildings have been made, so that it is expected that the improvements at this plant to be completed during the coming year will cost upward of a million dollars.

An Anticorrosive Grease

An anticorrosive grease, readily soluble in benzine even at the end of several months, can be prepared by emulsifying an aqueous solution of chromic acid or chromates with hydrocarbons, saponifiable fats and oils or the like, according to the *Wochenschrift für den Öffentlichen Bau Dienst*. The fatty constituents serve as an adhesive, while the chromic solution prevents rusting, it is claimed. Equal parts of fat and a 5 per cent solution of sodium bichromate are triturated in a mortar. This makes a viscous paste which keeps iron plates bright for several months and is easily removable with benzine.

The Kruse Forgings Company, 2515 South Artesian Avenue, Chicago, has changed its name to Atlas Forgings Company.

The Uses, Output and Market for Molybdenum

After discussing the history of molybdenum, its geology and metallurgical treatment in "A Treatise on Molybdenum," published in July issue of the Colorado School of Mines *Quarterly*, Golden, Col., Herman Fleck treats of its uses, the market for it, the output and statistics as follows:

USES FOR MOLYBDENUM

Molybdenum is used in form of oxides, ammonium salt and metal. Several tons a year are used in the United States in form of ammonium molybdate as laboratory reagent in the determination of phosphorus in iron ores, their products and in fertilizers. The salt finds a further use in fire-proofing fabric. The metal is used in self-hardening steel; from 5 to 10 per cent is introduced and the resulting steel is raised in elastic limit and tensile strength, and possesses greater toughness in addition to the former property. Wire made from it is said to have greater elongation and high tensile strength.

Other uses are in large castings; in gun barrels in which it is prized for its resistance to corrosive gas action; in armor plate; in armor piercing shells (the last two uses contradicted in the United States) in motor car steel and in magnets.

Equal parts of molybdenum and chromium introduced into steel are proclaimed more preferable for many of the above uses, especially self-hardening steel. Two to 5 per cent of molybdenum and 10 per cent chromium with little or no carbon are said to make steel acid resisting to a great degree. Nickel-molybdenum-ferroalloys also find use. The tensile strength of molybdenum wire is given at 200,000-270,000 lb. per sq. in. as compared to tungsten with 480,000-580,000 lb. per sq. in.

Molybdenum wire wound electric furnaces have special claims made for them. A thermo-couple which uses the metal has been described recently. The lower oxides of molybdenum are highly colored. Their use is recorded in coloring leather, rubber and porcelain. A soluble variety is used as a substitute for indigo.

In some form molybdenum is added as a preservative to certain smokeless powders.

MARKET, OUTPUT AND STATISTICS

Prior to 1900 little use was made of the metal. From 1900 to 1905 a gradual increase in the production of molybdenum took place. Then there was a decline until the opening of the war, when demand increased rapidly with rising prices and to-day astonishing figures record a marked advance.

Not long ago a prominent engineering journal scoffed at the alleged importance of molybdenum, but recently the same journal published an appeal from the Imperial Engineering Institute of England to Canadian producers of molybdenum ore. This is the history of the rare metals. Their growing utility cannot be denied. It must be remembered that all useful metals had their modest industrial beginning.

It has been stated frequently that dull markets were due to uncertain output. This may have been so before modern concentration methods were used, but this reason is no longer valid. When consumers consent to pay the price which makes the mining and concentrating enterprise worth while, the supply will prove adequate to the demand.

The principal production has been as follows:

The Australian output in 1902 was 15 tons, valued at £1841; in 1903 it was 29 tons, valued at £4450; and in 1904 it was 25 tons, valued at £2726.

The New South Wales output in 1911 was 20.65 tons, valued at £2591; in 1912 it was 56.5 tons, valued at £3706 and in 1913 it was 73 tons, valued at £6400. The New South Wales output in 1914 was 61 tons.

The Queensland output in 1911 was 99.5 tons, valued at £12,279; in 1912 it was 102.3 tons, valued at £17,349, and in 1913 it was 57 tons, valued at £16,185.

In 1915 Australian ores rose to \$28 a unit.

Not counting the small annual production of Norway and scattering parcels, the above figures represent most of the best years of molybdenum production.

There is little doubt that 1915 and 1916 will show astonishing figures, record output and prices together with considerable development in hitherto neglected fields.

It is not safe to predict a continuation of these, however, for an indefinite period. Substantial prosperity in rare metals has been marked by a slower growth

Melting Aluminum Chips

The Bureau of Mines, Department of the Interior, has just issued Bulletin 108, "Melting Aluminum Chips," by H. W. Gillett and G. M. James. It gives an account of experiments made to compare the recovery of metallic aluminum in melting down chips such as are obtained in the automobile factories in machining aluminum castings. As aluminum has sold at three times its normal price for the past year, and as a recovery of but 60 per cent of the metal in the chips is common, and a 90 per cent recovery is commercially possible, the preventable loss is of considerable magnitude. The bulletin discusses the causes of the high loss in the usual method of melting chips, and shows that the difficulty of getting the tiny globules of molten metal, resulting from the fusion of the very fine chips, to coalesce when covered with a skin of oxide and dirt, is apparently the main cause for low recoveries.

Two methods of melting can be successfully used to promote coalescence. In one method the chips are kept just above the fusion point and the globules made to coalesce by hand puddling, which breaks through the skin and makes the globules unite. In this method, melting is best done in an iron pot heated by oil. The other is by the use of a flux which dissolves off the skin of dirt and oxide, producing clean globules which can unite. The flux suggested is 85 per cent common salt, 15 per cent fluorspar, used in large amount (20 to 30 per cent of the weight of the chips), and mixed with the chips before charging. Much higher temperatures are required by this method than by the puddling method, so the iron-pot furnace is not practicable, and melting is best done in graphite crucibles or in a reverberatory furnace. The flux method does not require the constant hand puddling of the other method.

Since the presence of dirt and oxide causes low recoveries, the necessity for care and cleanliness in the collection and storage of chips is emphasized. Chips wet with cutting compound will oxidize superficially on storage, but by drying the chips by centrifuging this can be prevented.

A copy of this bulletin may be obtained free of charge by addressing the Director of the Bureau of Mines, Washington, D. C.

British Use of Coke for Steam Raising

Coke is being successfully used under steam boilers in England with forced draft apparatus, with boilers having little or no modification as regards the draft, and in connection with mechanical stokers using a fuel containing up to 50 per cent coke. When used with forced draft an apparatus is employed which has been developed by what is known as the London Coke Committee. At one institution of the London Metropolitan Asylums Board, 3000 tons per year were burned with an average evaporation of 10 lb. of water from and at 212 deg. Fahr. per lb. of coke as fired, and the overall thermal efficiency is figured at 78 per cent, assuming the average calorific value of coke at 12,000 B.t.u. The emphasis is that a great saving is accruing to the nation in that by utilizing the by-products of gas making, substituting coke for raw coal, ammonium sulphate, high explosive compounds and the numerous products obtainable from the coal tar are secured.

The Woodward Iron Company, Woodward, Ala., beginning Nov. 1, has advanced all wages and salaries 10 per cent. It is also announced that the company will have labor agents to look after its employees on account of the general exodus of laborers from the district. This is the third raise the company has voluntarily given its employees since pig iron began to advance.

A New National Industrial Organization

To Advise the Public, the Government and Employer and Employee in Industrial Problems—Announcement a Feature of National Founders Meeting

THE announcement of the formation of the National Industrial Conference Board, a co-operative body composed of representatives of national organizations of industrial employers, to provide a clearing house of economic information, a forum for constructive discussion and machinery for co-operative action on matters that affect the industrial development of the country, was a feature of the annual meeting of the National Founders' Association in session at the Hotel Astor, New York, as this issue goes to press. Reference to the movement was made in the address of the president of the association, William H. Barr, Lumen Bearing Company, Buffalo, N. Y., but the announcement in detail was made by Magnus W. Alexander, General Electric Company, West Lynn, Mass., who has been prominently identified with, if not largely

responsible for, the conference boards of co-operating associations on safety and sanitation and on apprenticeship training, not to mention illuminating and startling studies which he has made on the cost of hiring and firing employees and a recent contribution in these columns on the cost of medical and surgical supervision in industry.

Mr. Alexander summarized the purposes of the National Industrial Conference Board under seven heads, as here separately noted; and emphasized that these proposals are based on the fact "that in this country there is an enlightened public opinion toward fair-minded, progressive employers and reasonable, efficient employees, and that this opinion furnishes a stable foundation on which to build an enduring industrial prosperity." His address substantially in full was as follows:

The National Industrial Conference Board

BY M. W. ALEXANDER

The primary purpose in the formation of this conference board is to study the problems which confront the manufacturer in this country; problems which will arise, dealing with changing world conditions, affecting all industries. Heretofore, to a substantial extent, each manufacturer has studied only the problem directly affecting himself, ignoring the fact that all industry is inter-related and that there is a vital need for co-operative action and united effort. The war has brought many new problems, and peace will bring many more. These must be studied and solved.

MISUNDERSTANDING BETWEEN MANUFACTURER AND THE PUBLIC

The conference board will be a clearing house of information. Its purpose will be to analyze and present the essential elements in the situation, suggest methods and inspire united and intelligent action. Industry in this country must have the sympathetic support of the public. It must have the co-operation of the Government and it must act intelligently and definitely on its own account. The life of the nation is bound up in its industries and a broad patriotic purpose on the part of manufacturers and employers of labor will bring

about increased prosperity and greater prestige for the country itself.

There have been times when the public and the manufacturing industries have misunderstood each other; when the manufacturer assumed an antagonism on the part of the public which did not exist; when the public took the position that the manufacturer was indifferent to the public welfare and solicitous only for his own prosperity. Such a situation should never have developed and would not have developed except for the lack of information of each party of the purpose and intent of the other. It is part of the work of this conference board to promote a clear understanding between the employer of labor—the manufacturer—on the one side and the public on the other, and this can be best accomplished by a presentation of actual facts and a public announcement of purpose.

MISUNDERSTANDING BETWEEN MANUFACTURER AND GOVERNMENT

During the past few years there have been occasions when there was either open or concealed antagonism between manufacturers and the Government, and this was also due to a lack of understanding; to a lack of

Purposes of National Industrial Conference Board Summarized

1. To stimulate the keen interest and active assistance of employers toward constructive study and equitable solution of economic issues in industry.
2. To foster maintenance of harmonious relations between employer and employee and between both and the Government.
3. To assist in the formulation and enactment of sound and constructive economic legislation by presenting publicly to legislators the fundamental facts involved in the legislation and their effect.
4. To bring about genuine co-operation between the Government and industry so that legislation hampering and restricting industry unnecessarily or un-
- justly may be avoided by a knowledge of the facts.
5. To present to the public facts showing the national benefits of industrial prosperity and the effect on employers and employees and consumers, and to stimulate, by accurate and truthful publicity intelligent sympathy for all proper efforts for industrial development.
6. To stimulate the employer to maintain good conditions of work; to provide fair treatment for his workers and to take a personal interest in them.
7. To develop among the employees a reasonable attitude toward manufacturers and other industry, to inspire a sense of fair play, efficiency and loyalty.

The essential point in connection with all of this is the purpose of the conference board to study every problem and its development, to resolve it, if possible, into its essential facts for the information of the public, of the Government, of labor, and all the members of the various associations represented on the board.

Personnel of the National Industrial Conference Board

Frederick P. Fish, chairman, of Fish, Richardson, Herrick & Neave, Boston.

Magnus W. Alexander, manager, with General Electric Company, West Lynn, Mass.

MEMBERSHIP AND REPRESENTATIVES

National Founders' Association, William H. Barr, president of the association, Lumen Bearing Company, Buffalo, N. Y. Magnus W. Alexander, General Electric Company, West Lynn, Mass.

National Metal Trades Association, W. H. Van Dervoort, president of the association; president Root & Van Dervoort Engineering Company, East Moline, Ill. Herbert H. Rice, General Motors Company, Detroit.

National Council for Industrial Defense, John Kirby, Jr., chairman of the association, president Dayton Mfg. Company, Dayton, Ohio. James A. Emery, general counsel of the association, Washington, D. C.

National Association of Manufacturers, George Pope, president of the association, Hartford, Conn. Stephen C. Mason, secretary McConway & Torley Company, Pittsburgh.

National Erectors' Association, S. P. Mitchell, chairman of the association, president Seaboard Construction Company, Philadelphia. Walter Drew, general counsel of the association, New York.

National Association of Cotton Manufacturers, A. Farwell Bemis, president of the association, president Bemis Brothers Bag Company, Boston. Albert Greene Duncan, treasurer Harmony Mills, Boston.

American Cotton Manufacturers' Association, John A. Law, president of the association, president Saxon Mills, Spartanburg, S. C. Ellison A. Smyth, president Pelzer Mfg. Company Greenville, S. C.

National Association of Wool Manufacturers, John P. Wood, president of the Association, vice-president Aberfoyle Mfg. Company, Philadelphia. George C. Hetzel, president George C. Hetzel Company, Chester, Pa.

Silk Association of America, Charles Cheney, president of the association, treasurer Cheney Brothers, South Manchester, Conn. Robert J. F. Schwarzenbach, Schwarzenbach, Huber & Co., New York.

United Typothete and Franklin Clubs of America, Albert W. Finlay, president of the association, president George H. Ellis Company, Boston. E. Lawrence Fell, president Franklin Printing Company, Philadelphia.

American Paper and Pulp Association, Arthur B. Daniels, president of the association, president L. L. Brown Paper Company, Adams, Mass. C. A. Crocker, president Crocker-McElwain Company, Holyoke, Mass.

Rubber Club of America, Harvey S. Firestone, president of the association, president Firestone Tire & Rubber Company, New York. Frederic C. Hood, treasurer Hood Rubber Company, Watertown, Mass.

publicity, and either the suppression of facts or the failure to present them properly. No government in the world deliberately utilizes its legislative machinery to hurt the industries of the country. No government and no legislator who thoroughly understands all the circumstances in the case will support legislation which hampers or cripples industry and indirectly hampers and cripples the prosperity of the country. This fact does not warrant argument.

Therefore, when legislation has been enacted which is in effect dangerous to industry, or which hampers the existence of our manufacturers, it is plain that it has been due to misunderstanding or lack of information. It is true that there are certain fundamental policies on which men disagree, and there are different opinions as to the effect of these policies. In the working out of these policies there is a chance to demonstrate their weakness or strength, but this demonstration can only be made by a clear presentation of the effect, and such a presentation of facts that there can be no dispute as to their accuracy.

BOARD TO REPORT ON PROPOSED LEGISLATION

The National Conference Board will seek to influence legislation only by the presentation of facts and arguments carefully studied and of a character leaving no doubt as to their accuracy. Whenever legislation is proposed it will be analyzed and its effect shown after careful study. The legislator charged with the enactment of this legislation will be presented with the findings of the conference board, and the public will be given the statement of facts, and in precisely the same way that they have been given to the legislator. There will be nothing concealed or suppressed, and there will be no presentation of arguments except in the full light of day and for the benefit of the whole people.

It is the belief of the founders of this conference board that in this way a large amount of available information can be collected and presented to Congress, or to the State legislatures, where industrial legislation is under consideration, and there is no doubt in their minds that this information will be welcome and utilized by those who are concerned with proper legislation. The obvious purpose of this work is to produce co-operation between the manufacturer and the legislator and the public. Resulting laws will be judged for themselves and will undoubtedly be effective from the point of view of all concerned.

AMERICANIZATION OF EMPLOYEES AN OBJECT

An important feature of the policy to be followed will be the education and training of apprentices. Every

effort will be made to study and develop a plan or plans by which every boy will be given an opportunity to gain a livelihood. An industrial nation should provide industrial training. We should make men as well as commodities.

The conference board also will give attention to the Americanization of workingmen, believing that the factory should be the training school not only for industrial efficiency but also for citizenship in all that the term implies.

TO BRING PUBLIC INTO LABOR DISPUTES

One of our great industrial problems is the satisfactory adjustment of labor troubles. That adjustment can only be brought about by co-operative effort and co-operative effort can be attained only by a complete understanding between the parties vitally concerned, the employer, the wage earner and the public. The inclusion of the public is absolutely necessary because, after all, it is the public which has the final and compelling voice in the adjustment of many labor troubles. It is the public which is most directly concerned, and the purpose of this conference board in all phases of its activity is to bring about a public understanding on all problems involved in industry.

The census of manufacturers for the year 1914 shows that there are 7,036,337 wage earners in the manufacturing industry. This is exclusive of 964,217 who are classed as salaried employees. Taking the wage earners only and assuming that each one has dependent on him or her in some way, two others, it is plain that more than 20,000,000 persons are dependent on the prosperity of the manufacturing industry for their comfort and their livelihood. This illustrates the stupendous stake which the manufacturing wage earner has in the industries of the country and the necessity that he co-operate in every way in bringing about the maintenance of the prosperity of this industry. His co-operation is not only essential to success, but it is necessary from a purely selfish point of view.

It is unfortunate, but true, that employers in the past have not taken a direct and intelligent interest in all of the vital problems involved in the industries with which they are identified. Some have been antagonistic to change and insisted on going their own way even when that way led to industrial strife and Governmental interference. Others have been apathetic and indifferent as to developments, while some have been entirely irresponsible to the ideas of progress proposed by their associates in business.

THE ASSOCIATIONS FORMING THE ASSOCIATION

Twelve national associations of industrial employers have organized the National Industrial Conference

Board. These associations comprise over 15,000 employers, who furnish industrial employment to about 7,000,000 workers in the United States. It is planned to bring other associations of a similar character into the co-operative work until the National Industrial Conference Board on Safety and Sanitation some years ago, has started a movement throughout the country.

All members of the board are intimately connected with the industrial development of the nation and bring to their deliberations on vital questions a broad knowledge, practical experience and a full realization of their responsibility. Reinforced by comprehensive study of the questions at issue, their combined judgment is intended to furnish a proper guide for individual and collective

action and to serve as a potent force in influencing policies of constituent associations and other organizations of a like character.

The board is developing the necessary machinery through which to utilize this knowledge and experience already accumulated and to enlarge on it by extensive research and study. The scope of the board's work is as broad as the field of the influences which tend to promote or retard industrial progress. The program embraces many intricate problems that demand solution, but these are still within the bounds of practical achievement. The board asks for the co-operation of the Government and the public, of its own members, and of the wage earners of the country.

Achievements of the National Founders' Association

BY WILLIAM H. BARR

The annual report of William H. Barr, as president of the National Founders' Association, was in part as follows:

The National Founders' Association is numerically larger and financially stronger than at any time in its history.

As we review the labors of our Association for the past 20 years, it is apparent that the absorbing study of industrial preparedness, in its every phase, is not a new thought. Perhaps, without realizing it, we have contributed to that establishment of manufacturing freedom and privilege, which has accelerated the more recent development of our national resources.

FAILURE OF COLLECTIVE BARGAINING

When our Association was formed and its first policy established, it was in the belief that it was possible amicably to adjust disputes between our members and the union, and place foundry practice on a more stable basis; but the Iron Molders' Union, as always, under unwise leadership, refused to make concessions or arbitrate differences. After holding over 2500 fruitless conferences, during a period of seven years, your council recognized the necessity of adopting a new and more militant policy. Thus failed an early and earnest attempt at collective bargaining, which demonstrated as clearly then as to-day the absolute economic futility of the plan.

THREE YEARS' WORK ON SAFETY AND SANITATION

Unquestionably, the present and future policy of our Association is, and should be, one of open opportunity for the material advancement of employees, with watchful interest for their physical comfort and safety. That we recognized this development of our policy was first indicated in the research work that has been done during the past three years by our committee on safety and sanitation. The ensuing investigation of foundry hazards resulted last year in the publishing of a graphic handbook exhaustively treating of the elimination or correction of these possible industrial dangers.

This handbook describes both original and existing methods in order that our members may be able to properly introduce corrective practices in the safety and sanitation of their plants. No other such comprehensive publication of a similar kind has ever been introduced. The work has been done along broad humanitarian lines, that health and benefit may accrue to all foundry employees.

The joint publication of the *Spirit of Caution* by the co-operating associations in the conference board is spreading the story of the constructive activities of these associations, in the safety field; while the individual bulletins are recognized as chapters of a textbook in the making, dealing with the most important phase of accident prevention, namely, the exercise of personal caution and effective methods of securing it.

Through the Conference Board of Physicians in Industrial Practice, which was organized by the Conference Board of Safety and Sanitation some years ago, much quiet effort has been made to induce employers to establish medical service in their plants, par-

ticularly to inaugurate a system of physical examination that safeguards employees against their own ailments and helps them to improve their health and efficiency.

Association endeavors have also been continued with respect to the revival of apprenticeship systems in industry. The joint conference board, during the year, investigated existing apprenticeship conditions in the major industries, and on the facts thus ascertained is planning action intended to stimulate and assist employers in various lines of manufacture to adopt apprenticeship systems that fit their needs. It is hoped to outline a fundamental plan that will be adopted more or less universally in plants of like character and size. Every foundryman understands that the need for developing skilled and intelligent journeymen, foremen and superintendents is of prime importance. The board points with pride to the approval with which their bulletins entitled "Practical Apprenticeship" is being received. The first number, dealing with "The Necessity of Apprenticeship," has been widely distributed and the second number on "Fundamentals of Apprenticeship" is now in preparation.

The most important development of the year in conference board work has recently been launched. The employers of the country may well look forward with keen anticipation to the work of this newly constituted Industrial Conference Board, whose efforts, to be carried out along the lines determined upon, should prove a boon to industrial development in the country, and of inestimable benefit to all concerned.

THE MANUFACTURER PLAYING A LONE HAND

During the past year some manufacturers not in our industry have helped the cause of labor materially by weakly granting demand after demand for increased wages or decreased hours, with no thought of the future, and having in mind only the filling of contracts which may have come to them because of the war in Europe. We do not blame a manufacturer for attempting to secure as much business as possible, but should insist that he look forward and try to realize the effect of his action on the future of his own business as well as on that of industry in general. No manufacturer should attempt to play a lone hand. He must recognize his own relationship to the great economical development, and he must not individually attempt practices which, if generally adopted, would have a destructive influence.

The point I wish to emphasize is that manufacturers who granted an uneconomic 8-hr. working day, or who increased wages out of all proportion to normal conditions, have sowed seed which will have a disastrous fruition.

LESS WORK WITH MORE PAY

We have had more strikes in the past year than ever before in the history of the country, but the disturbance, the agitation and the unrest which has developed has been the result, not of poverty but of prosperity. This again emphasizes the fact that organized labor is never satisfied, and is eternally bent on wrecking that structure of industry which has been erected

through the patience, persistence and patriotism of business men in this country, and which is the support and livelihood of labor itself.

In a recent union publication the attitude of socialistic labor, and this includes every trade union, is boldly and clearly stated. Quoting from this publication, this point is definitely made: "The effect of the labor unions is for less work, with more pay. Labor will not make any equivalent return for what capital concedes in wages. The unionist knows that the very essence of his fight is that he gives too much."

GOVERNMENT FIGURES ON INCREASED COST WITH SHORTENED DAY

Again, I direct your attention to the assertion made in connection with the commission which has been appointed to investigate the working of the so-called 8-hr. day, to the effect that there is no way of telling at the present time whether an 8-hr. day will increase the cost of production or not. That statement should be flatly contradicted, and one need not depend on the figures of manufacturers, the figures submitted by employers of labor, or by the railroads, to emphasize the contradiction. The United States Government investigated this very question, on increased cost of production as a result of decreased hours of labor, by direction of the Secretary of Commerce and Labor in 1904. That investigation reported that out of 336 establishments investigated, 297, or almost 89 per cent, showed that the cost of manufacture had been increased by the shorter working day. The increase ranged from 7 to 8 per cent, and in 110 establishments exceeded 10 per cent.

There is also a fallacy that shorter hours means greater efficiency, and that what is lost in time is made up in increased output. This fiction is also dissipated by the official figures of the same investigation, for 303 out of 334 plants, or almost 91 per cent, showed a decrease in product as result of reduced working hours. This curtailment ranged from 4 to 20 per cent, and in 159 establishments it was 11 per cent.

The Bureau of the Census of the Department of Commerce has furnished some additional food for thoughtful manufacturers. The bureau has given a summary of the manufacturers in the United States showing that in 275,793 establishments 8,265,426 persons are engaged in manufacturing. Of these there are more than seven million wage earners, and nearly a million salaried employees; that the capital employed is nearly twenty-three billion dollars; that the annual value of material used is more than fourteen billion dollars; the value of products more than twenty-four billion dollars; the value added by manufacturing nearly ten billion dollars; that one billion, three hundred million is paid in salaries, and more than four billion dollars in wages. Consider these figures and realize the importance of the manufacturing industry to the United States. Realize the value of manufacturing to the wage earners, and realize again the fact that the owners of that twenty-three billion dollars of capital are entitled to some consideration under the law.

What is the answer to the activities of labor and to the subservience of Congress to labor during the past year? The answer, gentlemen, is to study that report of the Bureau of Census, to realize your power for organization, to act patriotically for the good of the whole country, and to demand the rights which are granted you by the Constitution of the United States.

It was never intended that this country should be directed and dominated by the leaders of less than two million workers out of a total thirty millions, nor was it intended that the men and women who invested their money in industrial development should be deprived of their rights. The developments of the past year, politically and industrially, emphasize as never before the need of more comprehensive co-operative action in industry.

The United States Magnesite Corporation, 11 Pine Street, New York, has been organized to mine, mill and ship all grades of magnesite, including crude, calcined and dead burned also calcined and ground. The company deals in both foreign and domestic magnesite.

Proposed Consolidation of Engineers in the Tractor Field

Believing that standardization will prove as useful in the development and production of large numbers of tractors for farm and other work, as it has proved in the case of the automobile, committees of the Society of Automobile Engineers are working on subjects which relate to the production of tractors, such as anti-friction bearing sizes, carburetor fittings, silent chains, electrical equipment, engines and transmissions and iron and steel, as well as other materials. The work of engineers engaged in the motor car, tractor, aeronautic, motor boat and in some degree the internal combustion engine fields is closely interwoven, as each is concerned with the internal combustion engine. The aeronautic and motor boat engineers have decided to consolidate with the Society of Automobile Engineers and it is believed that the tractor engineers also will amalgamate with the same organization. It is also expected that the American Society of Agricultural Engineers and the National Gas Engine Association will co-operate in the work of a combined organization.

It has been proposed that the name of the combined society shall be the Society of Automotive Engineers, the word automotive meaning self-propelled and describing generally the engineering activities of the enlarged organization. It is planned that the board of governors of the organization shall include vice-presidents representing specially in each case motor car, aeronautic, tractor, marine and stationary combustion engineering. It is believed that the plan will bring about the quickest possible proper engineering development of tractors and that it is a markedly patriotic one as against international trade or other possible wars.

The technical papers to be presented at the one-day professional session of the winter meeting of the Society of Automobile Engineers in New York on Jan. 11, 1917, will be representative of the enlarged activities of the society. The papers committee, of which K. W. Zimmerschied is chairman, is making the arrangements. Capt. Virginus E. Clark, U. S. A., will present a paper on airplanes with special relation to engines. This paper is to deal also with the experiences of the Army aviators on the Mexican border and suggest improvements in construction. It is also hoped that a detailed description will be given of a foreign airplane engine, which has recently been produced commercially in this country. A paper is promised on the design of engines for farm tractors, and one on motor trucks, with reference particularly to the proposed military specifications.

Engineering Co-operation

The engineering co-operation movement is still progressing. According to information from C. E. Drayer, secretary of the Cleveland Engineering Society, the sub-committee on plan created by the conference in Chicago last April will meet at the rooms of the Cleveland Engineering Society on Nov. 21. The sub-committee consists of F. H. Newell, Morris L. Cooke, Hunter McDonald, Isham Randolph and Mr. Drayer. On the evening of that day a meeting of the Cleveland Engineering Society will be held. Mr. Newell will speak on "A Practical Plan of Co-operation;" Mr. Randolph on "What the Established Professional Man Owes to the Beginner," and Mr. McDonald on "Mussel Shoals as a Proposed Location for the Government Nitrate Plant."

E. C. Atkins & Co., saw manufacturers, Indianapolis, Ind., will buy the surplus artificial gas of the local Citizens' Gas Company at 10 cents per 1000 cu. ft. There are times when the usual consumers do not use all the gas the company manufactures and the firm named agrees to take all the excess, no matter how much, at any time.

De Camp & Sloan, Inc., is now the name of the De Camp & Sloan Mfg. Company, contract manufacturer and maker in general of special machinery, dies and tools, 420 Ogden Street, Newark, N. J. The corporation has taken over the property, assets and liabilities of the former partnership.

Larger Munitions Plants Will Get Orders

Not Likely That Smaller Companies Will Receive Much of the Government's Appropriation for Equipment

WASHINGTON, D. C., Nov. 14, 1916.—The extent to which the War Department will utilize the authority given it by the last annual military appropriation bill to purchase munitions in open market or by contract and the policy to be pursued by the Ordnance Bureau in equipping private plants with dies, gages, jigs, tools, fixtures and other special appliances for the manufacture of arms and ammunition on United States army standards, are the subjects of numerous inquiries now reaching Washington. While the plans of the officials have not yet been fully worked out, the correspondent of *THE IRON AGE* is able to present certain facts that will be of interest to all manufacturers desiring to make war materials for the Government.

AVAILABLE FOR PURCHASES, \$16,500,000

Under the terms of the military appropriation bill the Secretary of War can spend no less than \$16,500,000 in the purchase of munitions either in the open market or by contract. The expenditure of a large part of this sum has already been planned and the arsenals are now engaged in placing contracts for very substantial quantities of material, chiefly artillery ammunition in more or less complete form. It is the opinion of the ordnance experts that in most cases it will be to the advantage of the Government, in point of securing speedy deliveries as well as a superior product, to contract for finished parts of shells, shrapnel, etc., the assembling and loading being done at the Government arsenals. Some purchases of completed rounds will be made from time to time, however. The details of all contract purchases have been left to the officials in charge of the arsenals, the department merely ordering certain quantities of ammunition, leaving it to the arsenal heads to manufacture or contract for the material, as circumstances and conditions may dictate. Manufacturers desiring information as to the Government's purchases of ammunition should address their inquiries to the commanding officer of the Frankford (Pa.) Arsenal.

The adherence by the War Department to its time-honored policy with respect to making payments on contracts is causing considerable dissatisfaction among relatively small manufacturers, who are anxious to obtain orders for ammunition, small arms, etc. In accordance with this policy payments on contracts are usually made only after the material has been received and tested. In the case of shells, for example, payment is made for each lot on the delivery thereof, and such delivery is held to have taken place only when the lot has been inspected, accepted and boxed for shipment. Should the specifications call for a ballistic test, the sample shell must be fired with satisfactory results before acceptance. Under the present practice with respect to contracts for guns and gun carriages, partial payments are made when the process of manufacture has advanced to a point where the material might be taken over by the government and completed without the possibility of loss, and in these contracts it is specifically provided that when payments on account have been made title to the material covered thereby immediately vests in the United States.

The comparatively modest needs of the Government in the way of war material have heretofore been provided by a few relatively large manufacturers to whom terms of payment have not been of vital concern. The European war, however, has brought into existence a large number of small munition factories, operating with limited capital and stimulated by the fact that the American agents of the European allies have been willing to make substantial payments upon the placing of each contract, in most cases making final payment upon the delivery of the goods after inspection at the factory. The making of these terms has undoubtedly en-

abled the Allies to procure large quantities of material which they could not otherwise have obtained.

WHY LARGE PLANTS MAY BE FAVORED

Should the War Department adopt a policy similar to that of the Allies, it would unquestionably develop considerable competition for contracts which is not now in evidence; but two opinions diametrically opposed to each other are entertained by experienced officials on the one hand and by public men in Congress on the other, as to whether it is to the advantage of the Government to encourage a large number of small manufacturers to bid on contracts or to place the business with a few big concerns. From a political standpoint, and perhaps from that of the industrial interests at large, the popular plan would be for the Government to keep in running condition the largest possible number of small plants in order that they might be in shape to assist in meeting any emergency that might arise. On the other hand, the weight of opinion among the most experienced ordnance experts, especially those who have devoted considerable attention to studying the lessons of the European war, appears to be in favor of the placing of the great bulk, if not all, of the Government's business with a few large concerns equipped with up-to-date engineering organizations, as well as superior manufacturing facilities. The success that has attended the upbuilding of such concerns as the Krupps in Germany, the Creusot Works in France and the Armstrong plants in England is emphasized by these experts who also point to the fact that this concentration of business during times of peace has not prevented the speedy development of a large number of relatively small concerns when an emergency actually arose.

Under the hard and fast requirements of the army appropriation acts with respect to competition the War Department has not been able to frame a policy on broad lines, but while the ordnance experts are gratified at the increased competition which has been developed as the result of the placing of so much foreign business in the United States, it is doubtful that any one in the department would look with favor upon encouraging manufacturers who actually need financial assistance unless an emergency should be imminent. To do so would be to assume a heavy responsibility, in the opinion of the officials, for the future development of national preparedness must depend upon the whim of Congress, which, after the elections are over, and especially if the European war should be speedily terminated, may return to its former policy of niggardly treatment of both army and navy.

FOR PLANT EQUIPMENT, \$1,500,000

The War Department at an early date will determine the details of the project authorized by the military appropriation act for the equipment of private plants with dies, gages, jigs, etc., for the production of munitions on United States army standards. For this work there will be available about \$1,500,000 which, it is roughly estimated, will equip six or eight plants. Judging by inquiries received here there is a very general misapprehension as to the character of the equipment which the government will supply to private concerns under this appropriation. Certain small manufacturers have received the impression that the government will furnish all the tools necessary to make small arms or ammunition, or both, and will look to the manufacturer to supply only a factory site, the necessary buildings and motive power. As a matter of fact the department does not contemplate fitting up shops for the production of arms or ammunition, but merely to supply gages, dies, jigs and certain special attachments to be used in connection with plants

adequately equipped for doing general munitions work. A single set of gages, dies, jigs, etc., for the manufacture of the service rifle is estimated to cost approximately \$250,000 and to require several months for its production. With sufficient funds to provide only half a dozen special equipments it goes without saying that the department will use great care in selecting the particular plants to which they are to be assigned and will give weight to a number of considerations, including location, permanence, labor market, transportation facilities and feasibility of protection in case of war.

W. L. C.

EMPLOYMENT AND SERVICE

An Outline of the Functions of Such a Department

In a paper describing the scope of an employer's service department, presented at the annual congress of the National Safety Council at Detroit, Oct. 18, Dr. Otto P. Geier, Cincinnati Milling Machine Company, Cincinnati, laid down a series of principles to govern the work of such a department. The service department, according to him, must be more than an employment bureau if it is to do the most good. Dr. Geier's rules are as follows:

EMPLOYMENT SERVICE

Meet the applicant for a job with courtesy. You owe him something for the time and money he has spent in coming to you. The Employment Department is the workman's first impression of your methods of doing business. A cheap, surly employment clerk adds to your annual labor turn-over and shifting of the force.

LOCKER ROOM SERVICE

Having hired the man give him something in your plant which he can call his own. A locker will encourage personal dress and hygiene. The dirtier his work the more necessity for good washing and bathing facilities, and opportunity for change of clothes. Don't make your workman carry your shop dirt to his home.

MEDICAL SERVICE

Physical examinations used as a means merely to eliminate the unfit will fail lamentably. Give the employee the benefit of your physical findings. Begin his education as to the value of health and care of his body at the time of physical examination.

Raise the hygienic standards of your workmen in their homes by teaching them that cleanliness in the work-shop pays. Good toilet facilities encourage good habits, and prevent much intestinal intoxication. Good drinking fountains are factors of good health and deterrents of alcoholic habits. Good light and ventilation further increase the comfort, contentment and health of the worker.

No better method of engendering a good spirit in your shop can be found than by showing your employee that you value his fingers, toes and eyes above his productive efficiency.

Prompt, considerate, intelligent, professional attention by the plant physician, in properly equipped treatment rooms, bids fair to replace all "first aid jars," "handy men" and "quick eye pickers," in most industries. The employment of the right type of a full-time physician is economically sound in plants employing 500 men or more. Nurses should not be entrusted with surgical work unless under constant supervision. The time lost from disability will be reduced by at least one-half through such service.

Lost time from preventable sickness is greater than the loss of time from accidents. Stop this waste by supplying the workman with the advantages of an all-day clinic. You will thus supply one of his most fundamental needs. He has not been trained, like you, to seek a physician in the early stages of disease. It is only when invalidism has set in that the average workman seeks the advice of the right type of physician. But then it is usually too late. He has lost his earn-

ing capacity and you have lost a trained man whose instruction has cost you considerable money. Can you check your chronic absentees, intelligently and with justice, without the help of a physician and visiting nurse? The plant physician can forcibly teach the men that it pays to be healthy, steady and of good habits. The man of low earning capacity is a drag on industry. Your all-day dispensary acts as a medical and surgical clearing house, so that your men may be advised to seek out reputable surgeons and physicians, not only for themselves but for their families.

DENTAL SERVICE

The cost of this necessary service to the industrial groups can be materially lowered to them through the employment of a dentist by the mutual benefit association of the plant. The company can well afford to grant the time necessary for inspection, cleaning, prophylactic treatment and advice.

SICKNESS AND DEATH BENEFITS

The employees' health and insurance association is a further step in cementing a good feeling in the shop as well as providing this service at minimum cost. These associations should be organized so as to prevent sickness and accidents. Each department should have a committee on "health and safety" which shall feel free to make recommendations regarding both.

LUNCH ROOM SERVICE

Good clean food at low cost can be supplied by organizing the shop force and by having a committee supervise the operation of the kitchen and dining room. The company may provide the space and equipment, just as it should supply the dental equipment. No arguments need be advanced for this service. No mention need be made of its advantages over the saloon lunch room method.

BANKING AND LOAN SERVICE

Thrift is worth encouragement. We must provide a substitute for the loan shark. A savings account has been the making of many a workman. You men of business are all borrowers—you should not object therefore to be lenders of money to your own employees. A little advice, along with a small loan, frequently relieves a great mental strain under which no one can be productive. Join with your force in organizing a building and loan association. Invest your funds in the Good Housing movement by building homes through this association. Encourage your men in home ownership—labor needs its stabilizing influence.

RECREATION FACILITIES

Recreation facilities are valuable, but they heretofore have been over-emphasized by industry in comparison with the more fundamental factors mentioned above. Our educational work should give the employee a power of selection of the proper types of recreation which the community itself affords or can be made to afford its citizens. The formation of a base-ball team, a shop band, choral societies, giving of entertainments, are all useful in their way and can be made to contribute to this feeling of good-will and co-operation between employer and employee.

None of the advantages accruing to the worker through the operation of service departments should in any way substitute for a fair scale of wage, which must be made to keep pace with the ever increasing cost of living.

The Underwood Typewriter Company, Hartford, Conn., has adopted a profit-sharing plan under which it is believed that \$250,000 will be distributed next year to all employees who have been with the company two years or more. Under the plan 20 per cent of the company's net earnings is to be given in stock to its employees. Each employee may add to the amount set aside for his account, and as soon as a sufficient sum is held to his credit it will be used to buy stock of the company, which will be delivered to him.

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Industrial Preparedness at Home

In THE IRON AGE of Nov. 9 descriptions were given, with details of retail prices and selling terms, of a number of the products of German shops which were shown at the recent Toronto "Exhibit of Enemy Samples." More than two years ago British consular agents throughout the world began a collection of goods manufactured in Germany and Austria and found in various countries in competition with British products. At the Toronto exhibition these thousands of samples of textiles, clothing, hardware, tools and machinery which originally were brought together in England were shown again. The revelation thus given of the extent to which German products were used in British possessions and in neutral markets, the low prices at which they were sold and the studied efforts of the German manufacturers to adapt their product and prices to the demands of consumers in all parts of the world, opened the eyes not only of Canadians but of a good many visitors from the United States.

We are referring again to the article printed last week to show that whatever the indifference of Great Britain to the inroads of commercial competitors in other years, the war period has brought a great awakening which is to be looked on as but the beginning of a new era in British industry. Probably no question has been more frequently asked in the continued discussion of this country of the effect upon our commerce of the decisions reached at the Paris conference of Allies than that of the effect the Allies' trade agreements will have upon the export and home trade of the United States.

Highly significant in this connection is the statement in our British letter, printed elsewhere, that the iron and steel sub-committee of Lord Balfour's committee to recommend measures giving practical effect to the Paris conference decisions has urged the entire prohibition of iron and steel imports into the United Kingdom, at least through the period of demobilization and reconstruction. Such a prohibition, while aimed at Germany, would be highly detrimental to the steel trade of the United States. Whether so sweeping a proposal will be adopted may be questioned, but the fact that it is even considered should provoke serious thinking on the future of our own steel industry

when we come to the end of the war prosperity that has been thrust upon us.

That Great Britain and other belligerent countries, in the midst of a war calling upon their every resource in men and in wealth, should be giving such earnest consideration to questions bearing on the future of their industries is in striking contrast with the attitude toward these questions in some quarters in the United States. From a high Administrative source the manufacturers of this country have been told that they are only exhibiting timidity to ask that any measures be taken by the Government to safeguard our industries in the period of readjustment following the war. They have been assured, on the same authority that promised a reduction in the cost of living through a reduction of the tariff, that they have nothing to fear from any quarter in the world. Though they are paying the highest wages in our history, they are accused of raising the cry of wolf in suggesting the possibility of hurtful competition from foreign goods in this market after the war.

One of the members of the British committee referred to above—John Hodge, M.P.—in a recent address in South Wales said:

I have been in the past a free trader. In the steel trade all over the country we find employers who were ardent free traders who now believe that our trade must be protected—not from the point of view of the interest of the employers, but from the point of view of the national interest. It is only as the war has gone on that our national defect in the production of steel has been demonstrated. It seems to me necessary that our steel trade should be stimulated to the utmost possible extent, so that in the case of our sons or our sons' sons having to go through this dreadful ordeal once more, we may leave them a heritage of the material that will be useful to them. And that, as far as I have been able to see and gage, is almost the unanimous opinion of the steel trade from north, south, east and west.

The calamities of war are bringing to the people of Great Britain an appreciation of their common interests in a new policy for the development of their industries. Is it because the United States is so drunk with unearned prosperity that efforts to safeguard business after the war are attacked? Now that the exigencies of a political campaign need not be served, there may be more chance of dealing with the question on its merits.

Fire Prevention Making Good

Effective work is being done throughout the country in the removal of causes which lead to the destruction of property by fire. The question of fire prevention has been agitated for years, but only recently has this agitation taken the form of practical measures. For instance, in some cities the fire department now collects from property owners the cost of extinguishing a fire after an investigation has shown that the owner was negligent in guarding against danger from this source.

The National Board of Fire Underwriters, whose headquarters are in New York City, has published some interesting statistics showing the extent to which education on the subject of fire prevention has diminished the number of fires in the principal cities. New York City is stated to have had 1010 fewer fires in 1915 than in 1914, with a decrease of \$2,460,793 in aggregate losses, while the loss per fire was \$140.50 less than the lowest previous record. Chicago in 1915 had 1238 fewer fires and \$906,605 less in total fire losses than in 1914. Cincinnati had 430 fewer fires and \$333,903 less in losses in 1915 than in 1914. Milwaukee had 682 fewer fires and \$290,837 less losses in 1915 than in 1914. The Boston metropolitan district, which includes the city and 25 neighboring towns, has made a remarkable showing since appointing its fire prevention commissioner in 1914. In the month of June, 1916, 605 alarms were reported against 1337 in the corresponding month of 1914, which is a decrease in two years of 64 per cent.

While quoting these figures with some degree of satisfaction, the National Board of Fire Underwriters calls attention to the fact that after all only a beginning has been made in reducing the tremendous losses which this country annually suffers from fire. In the year 1915 the single item of dwelling house fires in the United States resulted in the enormous total of \$35,591,227. It is therefore demonstrated that a great deal of educational work and more drastic supervision by authorities are needed to bring fire losses into what might be considered reasonable limits.

The Tonnage of Tin Plate

Recent developments in the tin-plate trade direct attention to that once relatively unimportant branch of the steel industry. The independents have built a great many additional tin mills in the past twelve months, while the Steel Corporation, after a period of years in which it dismantled tin-plate plants rather than built new ones, has completed a 24-mill plant at Gary and has started building 20 additional mills, ten at the Farrell works and ten at the Shenango works. The various extensions are evidently predicated upon expected heavy demand for tin plate in future years, in both the domestic and export markets. The export demand that exists at present is special, owing to the reduced output in South Wales occasioned by the war. The British Government, instead of exempting the Welsh tin-plate workers from military service, as desired by most of the manufacturers, has placed great restrictions upon the export of tin plate. The tin-plate exports of the United States in recent

months, averaging 20,000 gross tons per month since August, 1915, are not a measure of the export demand, since they represent only the amount of tin plate that could be spared, and perhaps ill spared at that. A much larger quantity would have been taken by foreign buyers had it been offered.

Another interesting development in the industry is the rise in tonnage wages due to the higher prices ruling. While only a few of the mills are governed by the Amalgamated Association's scale, which provides for a bi-monthly adjustment of wages according to the prices actually realized on shipments, the non-union mills pay substantially the same wages as the union mills. On the common weight the tonnage labor at the hot mill received \$9.28 per gross ton, after the reduction that occurred in the spring of last year. The settlement just made to fix wages for this month and next gives the men 12 per cent over the basis rates in the advanced scale of 1916-7, equal to a rate of \$11.50 per gross ton, and representing a total advance from the recent low point of 24 per cent.

It will be recalled that years ago there were many efforts to make tin-plate and sheet rolling more or less automatic, so as to dispense with the expensive hand labor. It is perfectly correct to say that all such efforts have failed, in the particular direction in which they were exerted, for to-day more men instead of fewer men are employed per mill. The job formerly held by one man was later held by the man and his helper, while now the more common case is for two men to work on equal terms at that one job, all in the eight hours prescribed for a turn. At the present time the average mill, even with a fair sprinkling of idleness in the year, will readily turn out 3500 gross tons, involving about \$40,000 a year paid in wages to the tonnage men, or several times the cost of the mill which it was desired to replace by automatic machinery. In no other important steel-rolling operation does such a proportion obtain, the investment per dollar of wages spent being much higher.

The attainment of this proportion, nevertheless, represents success on the part of the tin-plate industry rather than failure. The effort was made to reduce investment per ton of output by making the stand of rolls as productive as possible. The original turn limit was 5250 lb. for 30 gage, and the men often failed to make it, a mill doing well if it averaged 1700 gross tons per year, so that the output has been more than doubled.

For a number of years the increased output per mill furnished the chief increase in the total output, the number of mills increasing but slowly, but of late the number of mills has been undergoing a substantial increase, resulting in a double increase in tin-plate making capacity.

In 1902 and 1903 the American Tin Plate Company had 264 tin mills, while there were 71 independent mills. The output in the two years was estimated at 360,000 and 480,000 gross tons respectively, indicating average outputs per mill of 1075 tons and 1430 tons respectively. Then the leading interest dismantled mills until just before the recent completion of the Gary 24-mill plant it had only 196 mills, although with those mills it produced last year 569,879 gross tons of tin plate.

The number of independent mills has increased to about 240, precisely the number the leading interest will have when its Farrell and Shenango additions are completed, probably about the middle of next year. With its 480 mills the industry will be able to produce more than 1,600,000 gross tons of tin plate in a year, provided no large part of the tin mill capacity is used for the production of black-plate specialties, not tinned. That would be a larger tonnage than the structural mills produced prior to 1905, suggesting that in tonnage the tin-plate industry is only about a dozen years behind the structural mills.

Tin and terne plate production has been as follows, in gross tons:

1891.....	999	1905.....	493,500
1895.....	113,666	1910.....	722,770
1900.....	302,665	1915.....	1,055,936

From 1900 to 1905 the increase in output was 63 per cent. In the next five years it was 42 per cent, while in the next five years the increase rose to 46 per cent. The output for this year is forecasted at 1,350,000 gross tons, which would represent a 72 per cent increase over that of 1911, five years earlier.

Ten Trade Commissioners to Be Named

WASHINGTON, D. C., Nov. 14, 1916.—The Bureau of Foreign and Domestic Commerce announces that ten suitable men are wanted to serve as trade commissioners and special agents to investigate foreign markets for American goods, including metal-working machinery and prime movers in Russia and in Brazil; motor vehicles in Russia and the Far East; hardware in Africa, the Near East and India; mineral resources in the Far East; investment opportunities in Russia; furniture in South America; jewelry and silverware in South America; fancy groceries in South America, and ports and transportation facilities in Russia and the Far East. These agents will receive salaries not to exceed \$10 per day with all transportation expenses paid and \$4 per day allowance for subsistence. Examinations to secure the best men will be held in the larger cities of each State on Dec. 6.

Persons who meet the requirements and desire this examination should at once apply for Form 375, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C.; the secretary of the United States Civil Service Board, postoffice, Boston, Mass; Philadelphia, Pa.; Atlanta, Ga.; Cincinnati, Ohio; Chicago, Ill.; St. Paul, Minn.; Seattle, Wash.; San Francisco, Cal.; customhouse, New York; New Orleans, La.; or old customhouse, St. Louis, Mo. Applications should be properly executed and filed with the commission at Washington in time to arrange for the examination. Those who are appointed are expected to present the data obtained in straightforward, readable reports which will enable American manufacturers and exporters to plan campaigns for the sale of American goods in the markets investigated. Applications for the South American investigations will be expected to know Spanish and extra credit will be given for Portuguese. In the investigations including Russia, French is required and an extra credit given for Russian. No person will be admitted to any of these examinations who has not had previous training which would qualify him as an expert in the particular line to be investigated. Those who pass the civil service examination will be given oral tests later.

It is reported that the Interstate Commission's majority report on the Australian iron and steel industry recommends a substantial duty and the prohibition of exports of iron ore. The minority report urges the payment of a bounty.

CORRESPONDENCE

Securing Employee Loyalty and Interest

To the Editor: We note with some interest the leading article in THE IRON AGE of Oct. 26. This falls so nearly in line with a little idea that we had developed that we are taking the liberty of bringing it to your notice, thinking possibly it may help others along these same lines.

The basic idea in our case, however, was an endeavor to instill an interest in and loyalty to the company on the part of a new working force. In July, 1915, we had a general strike of all our boiler makers, helpers, etc., because we declined to renew a closed shop agreement, preferring to go on an open shop basis. For nearly a year we were practically shut down. Last spring, however, we began operations again with new men, practically none of whom were mechanics, but under the supervision of a new foreman we are making competent workmen out of raw material. None of them having ever been connected with this company before and a large number of them never having worked at any time steadily, we wanted to give them a feeling of permanency by making them realize that we have an interest in keeping them, and that their interest lies in staying with us.

Up to date nine folders have been issued, together with a special one put in the pay envelopes just prior to the enactment of the so-called Adamson law that undoubtedly averted a nation-wide railroad strike on Sept. 4.

E. R. FISH,
Vice-president and secretary, Heine Safety Boiler Company,
St. Louis, Oct. 27, 1916.

[The leaflets have four pages and when folded measure 2 1/4 x 5 1/4 in., a size calculated to slip into the pay envelope readily. They are entitled, "Talks on the Boiler Business." The first three dealt with the subject of costs, being divided into general, labor and material costs, special emphasis being laid upon the fact that co-operation on the part of the shop force would result in a decrease in the cost of production with a resulting increase in the amount of work that would come in the shop and the wages that would be paid. Safety first, good workmanship, care of tools and the factors entering into selling the company's products were described in the next four, and here, too, the idea of co-operation was emphasized. The importance of the carrying of accident and health insurance by the employees was emphasized in leaflet No. 8, those who had policies being urged to continue and those who did not to take one out. In the words of the leaflet, "It (insurance) relieves the employee of mental worry and to that extent makes him a happier man. Contented men do better and more work than those who are worried or discontented. It is good business, even if you are fortunate enough never to have to make a claim." The ninth leaflet was issued just prior to the installation of a cost keeping system and contained instructions on how the time card that was to be used should be filled out. Here, too, the idea of co-operation was given prominence, reference being made to the previous leaflets on the subject of costs, and closing with the statement, "The men in the shop are as much a part of the business as the salesmen, draftsmen, clerks or officers. We are all necessary to each other."—EDITOR.]

The Cyclops Steel Company, Titusville, Pa., of which Carl F. Baker is president, is erecting additional buildings and making many improvements in equipment. A new 10-in. mill will be installed in a building 75 x 110 ft.; steel melting furnaces will be located in a building 60 x 130 ft.; annealing furnaces in another, 60 x 70 ft.; blacksmith and heat-treating shop, 60 x 80 ft., and machine shop, 40 x 70 ft. An iron puddling department is to be added, as well as a chemical laboratory. The capacity of the plant, which produces high grade tool steel, will be quadrupled.

Naval Award Difficulties

WASHINGTON, D. C., Nov. 14, 1916.—The Navy Department is having great difficulty in determining the relative merits of the exceedingly varied proposals received for the construction of those vessels of the new naval program for which bids have been opened. On Nov. 10 contracts for the construction of four 35-knot destroyers were awarded to the Bath Iron Works, Bath, Me., at a cost of \$1,150,000 per vessel for hull and machinery. Contracts for 16 additional destroyers are yet to be awarded, but while bids apparently within the statutory limit of cost were received for all these vessels the proposals were so complicated by conditions that Secretary Daniels finally decided to request all the bidders to send representatives to Washington to take part in a conference that will be held to-morrow in the hope of reaching a common basis upon which awards can be made.

Experts of the various bureaus have diligently scanned the proposals for the four battleships, four scout cruisers and 29 submarines recently opened by the department, but as yet no recommendations have been made concerning any of these vessels. The scout cruisers in particular present difficulties which the department will probably not be able to solve without additional legislation. The failure of the contractors to submit bids within the limit of cost fixed by law leaves the department with the alternative of applying for an additional appropriation, estimated at about 10 per cent, or of so modifying the plans for the vessels as to render them unfit to perform the special function for which they are designed. The power plant of these vessels, as designed by the Bureau of Steam Engineering, is the largest ever installed in a vessel of equal tonnage and estimates made since the bids were opened indicate that unless the horsepower is substantially reduced it will not be possible to bring the vessels within the cost limit fixed by Congress. It is the best opinion, therefore, that the President will be requested to ask for a larger appropriation and to request Congress to include the necessary sum in the urgent deficiency appropriation bill, which will be one of the first measures to be enacted at the coming short session.

The uncertainty with regard to the political control of the Sixty-fifth Congress will probably result in a determined effort on the part of the Administration to secure, during the coming winter, the authorization of as large a part as possible of the remainder of the new naval program. The House Committee on Naval Affairs will begin the consideration of the new naval appropriation bill at an early date and it is understood that the measure will be reported to the House immediately after the holiday recess.

W. L. C.

The Steel Corporation's Largest Order Book

The largest unfilled orders in the history of the United States Steel Corporation were shown in the statement for Oct. 31, orders on the books then being 10,015,260 tons. This is an increase of 492,676 tons over the unfilled orders on Sept. 30. The previous high level was reported last May, when the unfilled orders amounted to 9,937,798 tons. A year ago on Oct. 31 the unfilled tonnage was 6,165,452 tons. The total this year is nearly three times that at the end of October, 1914. The following table gives the unfilled tonnage at the end of each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,468,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,587	5,390,356
August	9,660,357	4,908,445	4,213,331	5,223,468
September	9,522,584	5,317,618	2,787,667	5,003,785
October	10,015,260	6,165,452	3,461,097	4,513,767
November		7,189,489	3,324,592	4,396,347
December		7,806,220	3,836,643	4,282,108

Spain's iron-ore output in 1915, according to a recent report of the country's Mineral Census, was 5,617,839 tons. The pyrites output was 730,568 tons; iron-ore briquettes, 555,357 tons, and manganese ore, 14,328 tons. Wolfram ore mined was 511 tons.

Canadian Industrial Notes

TORONTO, Nov. 11, 1916.—According to a statement made by the Imperial Munitions Board, Ottawa, the Canadian manufacturers at work on munitions will be kept busy on the basis of present orders until June 30, 1917. Some orders expire Dec. 31 and others March 31. Those making the best records in deliveries are likely to receive the biggest share of the renewed orders. All necessary raw material to maintain the deliveries required is contracted for well ahead, and the board is in a good position in regard to the supply of steel. No uneasiness is caused by the reported shortage in the United States, because the board made large purchases of steel during the spring and summer months. The policy adopted some time ago whereby Canadian manufacturers would supply fuses, primers, brass disks, cartridge cases, and other component parts of shells is well established, and smaller quantities of these supplies are now being received from the United States. Many of these parts will in the near future be secured exclusively in Canada.

Despite the fact that the Canadian Government has permitted the Canadian railroads to import rails free of all duty except the war tax, the imports of rails have been so far very small. The government action was taken as a means of relieving what was represented as a serious shortage of steel, due to the fact that Canadian mills were so largely engaged in the manufacture of war munitions. The railroads wanted rails in order to move the crops, especially from some of the more recently settled districts.

The contract for 1000 tons of steel for the transmission line standards on the Dundas-Toronto power line has been awarded by the Hydro Commission to the Canadian Bridge Company, Walkerville, Ont. The amount involved is about \$110,000.

The statement is credited to Phelps Johnson, president Dominion Bridge Company, Walkerville, in an interview, that 20 per cent of the work being done by his company consists of bridge work, the balance being munitions. As to the outlook after the war, he states that the company is looking forward to foreign rather than domestic markets. In particular he is looking toward Russia as a field for large requirements.

Mark Workman, president Dominion Steel Corporation, has returned from an inspection trip over the properties of the corporation in Cape Breton. He was accompanied by D. H. McDougall, general manager, and returned much impressed with the improved conditions at the plant in regard to organization. He further stated that he was extremely gratified with the output of the steel works, every department of which is operating to full capacity. President Workman announced, in recognition of the high cost of living, a voluntary increase in wages in the form of a war bonus to the corporation's many employees, making the second advance since the beginning of the year.

The copper refinery of the Consolidated Mining & Smelting Company of Canada, Trail, B. C., which has been in operation for some weeks, is now in shape for the shipment of electrolytic copper. The plant will turn out about 5 tons daily—the first product of its kind in Canada.

David Milne, of Victoria, and G. R. Kennedy, Medicine Hat, B. C., are at the head of a syndicate which plans the construction of a rolling mill in South Vancouver, B. C., to cost \$150,000, and with capacity of 30 tons of bar iron per day.

It is announced that a permit has been received by the Dominion Government for the construction of merchant ships in Canada for Norway. Contracts for three vessels valued at \$3,500,000 have already been signed by Vancouver firms, two with the Wallace Shipbuilding Company and one with Coughlan & Co. Orders for seven or eight more vessels will be placed soon, and the total will reach not less than \$10,000,000. g.

The Leland-Gifford Company, Worcester, Mass., manufacturer of drilling machines, announces the opening of an office at room 418, Singer Building, 149 Broadway, New York, in charge of Walter F. Henly, formerly with the Fairbanks Company.

MANAGER AND WORKMEN*

Twenty-five Years of the Capital and Labor Problem—Lesson of the War

BY H. L. GANTT

About twenty-five years ago the financiers of this country discovered a new and seemingly a very important principle. They realized that, in many cases at least, the larger factories were making a larger percentage of profit than small ones, and conceived the idea of uniting the small ones under one system of management. By this move they certainly did give the small factories a better financial standing, at the same time reducing what might be called the financial or business expense.

By this they also reduced competition and decreased the cost of selling, which has always been a large element of expense. Under these conditions business prospered rapidly. The illustrated magazines were filled with the pictures of the "captains of industry" who had engineered these combinations, and it was freely predicted that the economies to be obtained were so great that it would only be a question of time before Europe would be flooded with American goods.

Our internal trade grew at an astounding rate, but the American invasion of Europe did not materialize, and it was not very long before we began to hear complaints of the increasing inefficiency of labor. Wages began to rise, but the output of the workmen did not rise correspondingly. The financier had undoubtedly effected economies in those portions of business directly under his control, but had not succeeded in producing a similar effect in those with which he did not come in direct contact.

AN EPIDEMIC OF COST KEEPING

As a result of this condition, the necessity for knowing factory costs became urgent, and there was such a great demand for people capable of installing cost systems that we had what might be called an epidemic of cost keeping in this country, during which time any reasonably intelligent clerk with a good address could get the job of installing a cost system somewhere. Undoubtedly, much that was done was beneficial, but in the desire to learn costs many people gave more prominence to their cost system than they did to their production methods. Systems of production were modified to conform with the cost-keeping methods.

Only the better of these systems survived, and many manufacturing concerns are to-day still without cost systems, due to the doubt on the part of the managers as to the value of such systems as have been installed.

EFFICIENCY THEN THE SLOGAN

About the time this epidemic began to wane the word "efficiency" became the slogan, and many of the cost accountants having read the writings of Mr. Taylor, Mr. Emerson and others bought stop watches and set up as efficiency engineers. They preached the doctrine, "if we could only make the workmen efficient all would be well." Undoubtedly much good would have been done if they could have accomplished their purpose.

Through these periods the relations between employer and employee have not improved, but have grown progressively worse, until to-day the industrial conditions of this country are, in many respects, deplorable, and we realize that neither cost control of manufacturing plants, which has been so strongly advocated by some, nor the type of efficiency control which has generally been preached, offers any solution for the troubles which beset our industrial relations.

The workman bears the same relation to the management that the soldier in the ranks bears to the officers. No amount of bravery on the part of the soldier or efficiency on the part of the workman can amount to very much if he is improperly directed. Leadership in industry and war is equally important.

*From an address before the Associated Industries of Massachusetts, Springfield, Mass., Sept. 23. Mr. Gantt is a consulting management engineer, 149 Broadway, New York.

The facts in military history have their exact counterpart in industrialism, and the real problem of to-day is how to select and train, or rather how to train and select, our industrial leaders.

LESSON TAUGHT BY GERMANY AND ENGLAND

There is a general feeling, however, that because our industries have in the past been directed in an autocratic manner that autocracy will continue to be the rule and that there is apparently no escape from it. The feeling seems to be quite widespread and to be substantiated by the marvelous industrial development of Germany under autocratic rule. While it is possible that autocracy in industry is the final stage, I do not think the case is by any means proved, although the contrast which democratic England and autocratic Germany presented at the outbreak of the war seems at first sight conclusive.

Although we have talked efficiency in this country for several years and many books have been written on the subject, many of us feel that the actual results so far have been lamentably small, and that we should be much more nearly in the class with England at the breaking out of the war than with Germany if we were suddenly confronted with her problems. It would seem, therefore, that we should find the fundamental reasons why England presented such a strong contrast to Germany and see if we cannot learn something therefrom.

It is only a short time since England led the world in the arts, but recently Germany has demonstrated her superiority to both England and France.

We must ask ourselves how this happened. It would seem to be something in this wise: The financiers of England, feeling that wealth could purchase whatever was needed for themselves and their national life, devoted their energies for a number of years to securing the wealth which was produced by others rather than to making strenuous efforts to produce it themselves. In this attempt they sent abroad millions of dollars to develop industries in foreign lands, which brought them great returns.

The leaders of Germany, on the other hand, not being able to exploit foreign peoples to the extent which was possible in England, turned their attention to developing their own resources, and the ability of their own people. Military autocracy forced business and industry to see that men were properly trained and that their health was safeguarded. In other words, because of the necessity of the military state for such men, the state saw to it that industry was so organized as to develop high grade men, with the result that a kind of industrial democracy was developed under the paternalistic guidance of an autocratic military party. Under such influences, the increase of education and the development of men went on apace, and were soon reflected in an industrial system which bid fair to surpass any other in the world.

In England, on the other hand, the business system was developed by an autocratic and "socially irresponsible finance," which, to a large extent, disregarded the interests of the workman and of the community. At the breaking out of the war the superiority of the industries of Germany over the industries of England was manifest, not only by the products of the industries, but by the feeling of the people and their loyalty to the national Government, which had so cared for, or disregarded, their individual welfare.

This superiority became so rapidly apparent that, in order to make any headway against Germany, England was obliged to imitate the methods which had been developed in Germany, and to say that the industries (particularly the munition factories) which were needed for the salvation of the country, must serve the country and not the individual. The increased efficiency which England has shown since the adoption of this method is most marked and in striking contrast with the inefficiency we are still displaying in similar work.

OUR INDUSTRIES MANAGED FOR AUTOCRATIC FINANCE

Confessedly our industries are managed in the interests of an autocratic finance. In Germany it has been proved beyond doubt that an industrial system, forced by military autocracy to serve the community,

is vastly stronger than an industrial system which serves only a financial autocracy.

England is beginning to demonstrate the same thing; for had England not been more efficient in the production of munitions than we have been in this country, it would have been indeed a sad day for the British Empire.

In considering these facts we should ask ourselves if there is not some fundamental fact which is accountable for the success of industry under such control. The one thing which stands out most prominently is the fact that, in the attempt to make the industries serve the community, *an attempt has been made to abolish industrial privilege and to give every man an opportunity to do what he can and reward him correspondingly.*

This is the most perfect form of democracy, and the facts that at first sight seem to indicate that autocracy produced greater efficiency than democracy really prove the contrary when we get real democracy.

EFFICIENCY IN MANAGEMENT THE GREAT NEED

In order to reward every man according to his deserts, we must have some means of measuring the efficiency of the service rendered.

So far the only efforts that have been made in this direction have been applied to the workman and they have apparently not helped us to solve our industrial problem. It is absolutely necessary for us to measure the efficiency of those in control, for without efficiency in management, efficiency of the workmen is relatively useless, even if it is possible to get it. With an efficient management there is but little difficulty in training the workmen to be efficient. This has been proved so many times and so clearly that there can be absolutely no doubt about it. Our most serious trouble is incompetency in high places. As long as that remains uncorrected no amount of efficiency in the workmen will avail very much.

Can we find a measure, or even a correct indication, of that efficiency? I think we can, but we shall have to revise our methods of cost accounting, for those at present in vogue are not designed for that purpose.

Waukesha Co-operative Industrial School

The Waukesha Motor Company, Waukesha, Wis., builder of automobiles, trucks and tractors, is co-operating with the local board of education in supplying facilities for industrial education. A plan which involves no investment or maintenance cost has been developed. The company has permitted the school authorities to establish a school organization within its plant, open to any person who qualifies by being 16 years of age or over. Part of each working day will be devoted to actual instruction and teaching of the rudiments of gas engineering, civics and general subjects, and the remainder of the time to practical work within the factory. The company pays full wages for the time devoted to schooling as for employment to all who take advantage of the course. Two cents per student hour is charged by the company to the school board of Waukesha as a nominal fee.

Safety Discipline

A recent pointed safety bulletin notice of the Youngstown Sheet & Tube Company, covering the disciplining of an employee for an infraction of a rule, was as follows:

There is a stringent rule in our plant that cars being loaded, unloaded and under repairs must be protected by blue flags during the day and blue lights at night.

These flags or lanterns can only be removed by orders of the foreman, who placed them, or the foreman who succeeds to the job.

On Oct. 8, there were three cars being unloaded; they were protected by the regular blue lights. A member of a railroad crew took the lights away without authority and coupled onto the cars. Fortunately no one was injured; that, however, was not the fault of the trainman.

This man is no longer in our employ. He was discharged. We want no man to work for us who has so little regard for the life and limbs of his fellow employees.

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Henry Ford to Build Two Blast Furnaces

The Ford Motor Company, Detroit, Mich., has placed a contract with the Riter-Conley Company, Pittsburgh, for two blast furnaces to be built in Springwell Township, southwest of Detroit. They will be about 90 x 25 ft., and the output will be used in large foundries the Ford Motor Company also proposes to erect. Julian Kennedy, Bessemer Building, Pittsburgh, is consulting engineer.

The location selected for the new furnaces is on the River Rouge, which empties into the Detroit River at Delray, just south of Detroit. As announced some months ago, it is the plan of the Ford interests to use metal direct from a mixer in the making of castings, and it is stated that the company's metallurgists expect, as the result of the experiments of the past two years, to produce a casting in this way having unusual strength, though no publication has been made as yet of the method by which this will be made possible. The plans for the operations to be carried on at the River Rouge site, which is 18 miles from the present Ford works, include an extensive plant for the manufacture of tractors.

Compromise on Transcontinental Freight Rates

WASHINGTON, D. C., Nov. 14, 1916.—A tentative decision was reached by the Interstate Commerce Commission to-day to cancel the proposed general increases in freight rates by transcontinental roads on traffic from and to the Pacific coast and intermountain points. In place of the proposed tariffs a compromise schedule will be permitted to be filed, providing for a maximum increase of 10c. per 100 lb., carloads, and 25c. on less than carloads, to Pacific coast terminals.

The decision operates to reduce the existing discrimination in rates against intermountain points; but as the rates authorized to-day are tentative only, and subject to protest by shippers, the final adjustment of the intermountain controversy may depend upon the outcome of the hearings on the petitions filed under the fourth section of the interstate commerce act, which prohibits lower rates for long than for short hauls, except under certain circumstances.

W. L. C.

The Colorado Plan of Employee Representation

That the industrial representation plan of the Colorado Fuel & Iron Company, first put into effect a year ago at the mining properties and later adopted at the Minnequa Steel Works, promises to settle satisfactorily all disputes between the company and its employees, is the opinion expressed by the company's publication, the *Bulletin*. More than 50 grievances, covering a wide range of matters pertaining to living and working conditions have been presented to the president's industrial representative, while many of minor importance have been righted by local officials. Under the joint agreement the industrial committee consists of 30 representatives of the employees chosen by secret ballot and 25 delegated by the president. This committee, which meets at intervals of a few months, inaugurated the system of appeal and provided the machinery for equitable adjustments.

German Steel Shipments Still Lower

Shipments of the German Steel Works Union for September were 244,212 metric tons, the lowest in any month this year and the lowest since November, 1915, when they were 241,750 tons. The average for 1915 was 270,510 tons per month. There has been a decided decline since May, this year, when the total was 311,620 tons, the largest for 1916. The September shipments were made up of 79,935 tons of semi-finished steel, 85,542 tons of railroad material and 78,735 tons of shapes.

The San Francisco branch of the Orenstein-Arthur Koppel Company reports an exceptionally large business the last few months from the Hawaiian Islands, owing to the rapid development of sugar plantations.

National-Acme to Be Reorganized

Plans for the reorganization of the National-Acme Mfg. Company, Cleveland, including an increase in its capital stock, are under way and will doubtless be carried out shortly. The company has entered into an agreement with Eastman Dillon & Co., bankers, 71 Broadway, New York, who are to purchase the stock for themselves and associates. The syndicate will pay for each share of stock \$150 in cash and five shares in stock with a par value of \$50 in a new company of similar name to be organized to acquire the assets of the present company. The Cleveland Trust Company has been designated as depositary of the stock and agent to handle the transaction. The company recently called for redemption on Jan. 1 its \$1,500,000 in preferred stock and has outstanding \$5,000,000 in common stock, which is quoted around 290 on the Cleveland Stock Exchange. Under the terms of the agreement the present management will continue for five years and the stockholders of the present company will retain a large interest in the new company. The reorganization plans will be carried out as soon as they are approved by the holders of a sufficient amount of stock, but it is expected that this approval will be readily secured.

The National-Acme Company, in addition to its Cleveland plant, operates one in Windsor, Vt., formerly the plant of the Windsor Machine Tool Company, which it acquired early in the year, and another in Montreal. It recently acquired a new site in Cleveland on which it will erect a large plant for its machine screw products department, having no room for the required further expansion at its present location.

Output of Australia's Steel Plant

The statement of the Broken Hill Proprietary Company, Ltd., of Sydney, Australia, for the six months ended May 31, 1916, showed a profit of about \$1,717,000 after deducting depreciation, interest and sinking fund charges. The pig iron produced in the six months was 53,974 tons, but it is stated that the furnace is capable of making more iron if more coke were available. Construction of 33 more coke ovens was proceeding and the fourth open-hearth furnace was completed in March, 1916. The steel ingot output for the period was 49,089 tons which will be materially increased when the 1000-ton mixer is installed. The commercial steel rolled was 36,862 tons. It is also stated that completion of the 18-in. mill was delayed because of inability to obtain parts, but that it would probably be ready early in October. The 12 and 8-in. mills would be completed probably before the end of 1916. The rod mill had not yet been shipped from the United States. The duplication of the blast furnace and coking plant is under consideration.

Electrolytic Ferromanganese in Washington

Electrically made ferromanganese, tungsten and other alloys have been made at Tacoma, Wash., for about a year. Henry O. Marcy, in an article "Ferromanganese Smelting in Electric Furnaces," in the *Engineering and Mining Journal*, says that a \$50,000 electric furnace utilizes hydroelectric power at Tacoma for this purpose and that the ores are delivered at economical rates. The manganese ore is a silicate of manganese running 20 to 50 per cent in manganese and it is found in the foothills of the Olympian range of mountains near Stair Case in Mason County.

The power forging of chain cables is the subject of a paper to be read at a meeting of the Society of Naval Architects and Marine Engineers to-night at the Engineering Societies Building, 29 West Thirty-ninth Street, New York, by Naval Constructor F. G. Coburn, U. S. N.

Tin exports from the Federated Malay States were 3636 tons in September against 3732 tons in August. The total to Oct. 1, 1916, was 32,610 tons, against 34,840 tons to Oct. 1, 1915, and 36,698 tons to Oct. 1, 1914.

Riter-Conley Large Contracts

The Riter-Conley Company, Pittsburgh, has been awarded a contract by the Bethlehem Steel Company to erect at Sparrows Point, Md., four complete 500-ton blast furnaces. The contract comprises the structural steel, furnace plate work, furnace castings, stoves, piping, gas washers, cast houses, skips, buggies, etc. It will require about 10,000 tons of plates and shapes. The same company also has a contract now under way for furnishing and erecting for the Bethlehem Company at Sparrows Point the structural steel for buildings to contain 24 hot tin mills. This includes the main mill building, tin mill building, carpenter and blacksmith shop and store room. This work was contracted for by the Baltimore Sheet & Tin Plate Company, taken over some time ago by the Bethlehem Company, and it involves about 4000 tons of structural steel.

Several months ago the Vacuum Oil Company contracted with the Riter-Conley Company for a large amount of oil refinery work, consisting of storage tanks, stills, condensers, agitators, etc. This contract, taking about 11,000 tons of plates, has been about half completed. The refinery will be located at Paulsboro, N. J., and when completed will be one of the largest in the country. The Riter-Conley Company will make final shipments soon of the material, about 2000 tons, for the erection of a 3,000,000-cu. ft. gas holder for the Detroit City Gas Light Company, Detroit.

A recent addition to the plant of the Riter-Conley Company, at Leetsdale, Pa., is a tool equipment building, 140 x 220 ft. This building will house the erection tools of the company, and is equipped to take care of their repairs and upkeep. A 15-ton crane runs the entire length of the building.

Pacific Coast Steel Company Changes

E. M. Wilson and William Pigott of Seattle, Wash., have purchased all the interests of D. P. Doak and his associates in the Pacific Coast Steel Company. D. P. Doak and F. M. Doak, now directors, will be elected as soon as their successors are elected. The company is operating open-hearth steel plants and rolling mills at both Seattle, Wash., and South San Francisco, Calif., employing at each place about 2,000 men. All operations at San Francisco are under the management and control of E. M. Wilson, president. The company denies the report that it is manufacturing munitions of any kind, though it is doing considerable Oriental business in steel bars.

Condition of Locomotive Orders

Orders for 30 locomotives have been placed in the last week with the Baldwin Locomotive Works. Of these, 20 Pacific and five switching locomotives are for the Atlantic Coast Line. Inquiries were 37, of which 35 are from the Missouri, Kansas & Texas. Orders in November to Nov. 13 were 157, of which 100 are for export. In October 779 locomotives were ordered, which is the largest for any month this year, the next largest having been 565 in February. For the second half of this year to Nov. 1 orders for 1271 locomotives have been placed, comparing with 2124 for the first six months. In 1915 only 1972 locomotives were ordered.

Rogers, Brown & Co., Cincinnati, say in their last market letter: "The decision of the railroads south of the Ohio to prohibit their cars leaving their own tracks will have a very marked effect on the coke market and many now under contract for cokes produced on those lines may, because of this decision, be forced to buy spot coke from other districts to keep their plants going." Similar restrictions as to cars are being imposed by various other roads.

Profits of the Prague Iron Industry Company, one of the principal Austrian steel makers, show a net of about \$3,150,000 as against \$1,962,000 in the previous year, with a dividend of 38 per cent against 24 per cent. Other Austrian and German companies show similar results.

The Car Shortage Hearing

Necessity for action to bring relief from the prevailing car shortage confronts the Interstate Commerce Commission, the railroads, shippers and consignees, according to developments at the commission's hearing last week at Louisville, Ky. That an emergency order may soon be issued has been intimated by Commissioner Charles C. McChord, who presided at the hearing, in view of the apparent inability of the railroads to effect a remedy themselves.

It became evident as soon as the hearing was begun at Louisville that the condition is critical. The unusually heavy traffic of the past several months and the eastward movement and congested condition on the coast have tended to accumulate an excess of cars on the Eastern railroads, many of them held for unloading and more of the empties being retained by the Eastern roads for their own use. North Central and Western roads, in an endeavor to keep their equipment up to a sufficient basis, were shown to have begun appropriating any foreign cars that came on their lines, at the same time attempting to hold their own equipment. Southern roads, which ship out more than they bring back, presently began to be under equipped, and more or less general wholesale embargoes have been declared by the Louisville & Nashville, Illinois Central, Chesapeake & Ohio, Norfolk & Western, Atlantic Coast Line and others.

During the last two years the coal operators having mines in Kentucky, West Virginia, Virginia and Tennessee have shipped largely into Northern markets, and last summer, during the labor troubles in the Ohio and neighboring fields, booked numerous contracts. After the Louisville & Nashville coal car equipment on its lines had fallen to 39 per cent, and after the Chesapeake & Ohio had "lost" more than 20,000 of its coal cars, these roads declared embargoes, the previous rate of deliveries having been slow. Immediately the North Central industries began to face a coal famine or the extremely advanced prices on the open market.

It developed at the hearing that roads which hold large numbers of Southern-owned coal cars are using them in a large part for hauling ore from northern Michigan and the Northwest, while at the same time it is testified that these very operations are in need of coal these cars should be hauling. Not only are coal and ore cars affected similarly, but all kinds of equipment until, according to evidence given at the hearing, the car shortage is perhaps the most serious factor that is limiting business.

Efforts are being made to arrange for a supply of coal equipment from the Northern roads to the Southern coal carriers for return, in order to relieve a condition, which in Michigan, for instance, is said to threaten a coal famine inside of 30 days. Millions of tons of coal are said to be badly needed in the Lake region and must be delivered before shipping closes Nov. 25.

Not only is the hearing endeavoring to discover some means by which immediate relief can be given, but means by which recurrence can be prevented. Increased demurrage rates, increased per diem charges and strict exchange rules to be enforced by a body clothed with authority have been favored by practically all the expert witnesses.

Germany's September Pig-Iron Output

The daily output of pig iron in Germany for September was 37,225 tons, the highest rate since the war started. The August rate was 36,945 tons. The total for September, 1,116,752 tons, was made up of 169,102 tons of foundry iron, 11,302 tons of Bessemer iron, 725,142 tons of basic or Thomas iron, 195,744 tons of steelmaking iron and spiegeleisen and 15,462 tons of forge or puddle iron. The production for the first nine months was 9,890,000 tons against 8,660,000 tons to Oct. 1, 1915.

Iron-ore exports from Spain for the first six months of this year were 3,001,877 tons against 2,593,185 tons in the corresponding half of 1915. Manganese ore exports declined from 5120 tons to 3667 tons for the same period.

Iron and Steel Markets

A \$5 ADVANCE IN RAILS

Pig Iron and Finished Steel Higher

Mills Continue to Turn Away Business for Next Year—Large British Rail Inquiry

The higher prices of pig iron and of steel products go, the more easily new advances are made. The ultimate effect of the new high levels on the trade of manufacturing buyers of finished steel counts for little in the pell-mell rush to get the steel.

The crippling of railroad service is more serious. Car shortages are now no more marked than the scarcity of motive power and there is the certainty of worse troubles later in the year. With 10,000 cars awaiting transfer to its lines west of Pittsburgh, the Pennsylvania Railroad has embargoed westward shipments originating east of Pittsburgh, and iron and steel works are chief sufferers. Frequent bankings of blast furnaces because of coke car shortages are to be expected.

An advance of \$5 a ton in rail prices was announced by the Steel Corporation Nov. 15, applying to all deliveries. This puts Bessemer rails at \$38 and open-hearth rails at \$40. Other rail makers also quote the new prices. On May 1 the previous advance of \$5, or to \$33 and \$35, went into effect, after large tonnages for 1917 had been placed at \$28 and \$30. In angle bars an advance of \$5 a ton was also made this week.

With demand pressing them on every side for steel products carrying 50 to 200 per cent larger profits than rails, the kind of deliveries mills will make on rails taken for the first half of 1917 at \$10 less than to-day's prices is already in question.

There is no small stir over a British inquiry for nearly 1000 miles of 75-lb. rails. Practically American specifications will be accepted, and the profit is attractive, but it is doubtful, even with the 1917 delivery permissible, if the 135,000 tons involved, including accessories, can be placed in this country.

In the pig-iron market the effect of the large October sales of Southern iron for export is still cumulative and estimates of the extent to which the advance will go take a wide range. On Southern No. 2 iron \$20 Birmingham was established as the market at the end of last week, though at the same time sales at \$18.50 and \$19 were reported. Early this week \$19 iron was still to be had for delivery in the second half of 1917.

Demand for spot pig iron is still relatively small. The possibility of a shortage next year is the dominant influence, and the buying, which has been less than in the previous week, has been largely for first and second half of next year. Some consumers have not been driven in by the rapid advances, but pending inquiry is considerable and higher prices are indicated.

Bessemer iron has advanced \$3 in the week or to \$30 at Valley furnace, and basic iron \$2, or to \$25 at furnace. A sale of 4500 tons of Bessemer iron was made at \$28 on Nov. 11; this week the advance to \$30 was made on smaller sales. A sale of 10,000 tons of basic for the second half of 1917 is reported

at \$24, and one of 7000 tons for the first quarter at \$25. There is a 20,000-ton inquiry for basic iron at Youngstown.

After an advance of \$2 a ton on lap weld iron and steel pipe two weeks ago, both lap and butt weld sizes are \$2 a ton higher this week. Sheets both black and galvanized have gone up \$3 a ton, and sheet mills are rapidly developing the sold-up condition of tin-plate producers for the first half of 1917.

Sales of steel to the Allies for the second half of 1917 thus far include 200,000 tons placed with Eastern mills, chiefly shell steel. Other transactions, also covering the second half, include rails, plates and billets for the Allied governments.

A leading steel interest has sold plates for delivery extending to the middle of 1918. The call for ship plates is insatiate and as high as 4.50c. for forward delivery has been done, while for several hundred tons for early delivery 5.50c. was paid. Japan has bought 7000 to 10,000 tons of plates this week and a Canadian car works has just placed 15,000 tons of plates and shapes in eastern Pennsylvania.

The disposition of mills to defer consideration of business offered for next year is more marked. Each week large tonnages both export and domestic appear to go begging. Chicago reports the whole market for steel products becoming more restricted and abnormal. A feature there is the large demand for tie plates, two railroads having just placed 17,000 tons.

Lake Superior ore prices for 1917 may be established any day. It is likely that non-Bessemer ores will be \$1 higher while the advance in Bessemer ores may be quite a little more. The sudden coming on of zero weather has cut down shipments from Lake Superior mines in the past few days.

Pittsburgh

PITTSBURGH, PA., Nov. 14, 1916.

Prices on pig iron, some steel products and scrap moved up faster the past week than probably in any week since the phenomenal rise started. Bessemer pig iron, which sold a week ago at \$27, Valley furnace, sold on Monday at \$30; basic went up \$2 and foundry iron from \$1 to \$2 per ton. Reports are that soft steel billets for fairly prompt shipment have sold at \$57.50, maker's mill, a heavy premium having been paid because the mill promised some shipments this year. Both butt and lap weld black and galvanized iron and steel pipe have been advanced \$2 per ton; minimum prices on black and galvanized sheets are up about \$3, and nearly all grades of scrap \$1 or more. Furnace coke has held steady, but no contracts are being placed, buyers being scared off on account of the high prices asked. The insistent heavy export demand for pig iron, billets, sheet bars and many kinds of finished steel is mainly responsible for the dizzy level that prices have reached. One local mill states it has turned down the past week more than 200,000 tons of finished material which it could have taken at very profitable prices, but is so congested with orders that it could not possibly make the deliveries wanted. The railroad situation, which is deplorable, is steadily getting worse. The Pennsylvania Railroad has declared an embargo on all freight routed over its Western lines, originating at any point east of Pittsburgh. This has shut off shipments to im-

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics
At date, one week, one month, and one year previous

For Early Delivery

	Nov. 15.	Nov. 8.	Oct. 18.	Nov. 17.
Pig Iron, Per Gross Ton:	1916.	1916.	1916.	1915.
No. 2 X, Philadelphia...	\$25.00	\$24.00	\$20.50	\$17.25
No. 2 Valley furnace...	25.00	24.00	20.00	15.75
No. 2 Southern, Cin'ti...	22.90	20.90	18.40	16.40
No. 2 Birmingham, Ala...	20.00	18.00	15.50	13.50
No. 2 furnace, Chicago*...	26.00	25.00	19.00	17.50
Basic, del'n eastern Pa...	26.00	25.00	20.00	17.50
Basic, Valley furnace...	25.00	23.00	20.00	16.00
Bessemer, Pittsburgh...	29.95	27.95	23.95	17.70
Malleable Bess., Ch'go*...	26.00	25.00	19.50	17.50
Gray forge, Pittsburgh...	25.95	23.95	20.45	15.95
L. S. charcoal, Chicago...	25.75	25.75	20.25	17.25

Rails, Billets, etc., Per Gross Ton:

Bess. rails, heavy, at mill	38.00	33.00	33.00	28.00
O-h. rails, heavy, at mill	40.00	35.00	35.00	30.00
Bess. billets, Pittsburgh...	52.50	50.00	45.00	27.00
O-h. billets, Pittsburgh...	52.50	50.00	45.00	27.00
O-h. sheet bars, P'gh...	52.50	50.00	45.00	28.00
Forging billets, base, P'gh	76.50	75.00	69.00	48.00
O-h. billets, Phila...	55.00	50.00	50.00	34.00
Wire rods, Pittsburgh...	65.00	60.00	55.00	37.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	2.659	2.659	2.659	1.769
Iron bars, Pittsburgh...	2.85	2.85	2.75	1.60
Iron bars, Chicago...	2.65	2.40	2.35	1.50
Steel bars, Pittsburgh...	2.75	2.75	2.75	1.70
Steel bars, New York...	2.919	2.919	2.919	1.869
Tank plates, Pittsburgh...	4.25	4.00	4.00	1.70
Tank plates, New York...	4.419	4.169	4.169	1.869
Beams, etc., Pittsburgh...	2.80	2.75	2.75	1.60
Beams, etc., New York...	2.969	2.869	2.869	1.769
Skelp, grooved steel, P'gh	2.70	2.70	2.50	1.60
Skelp, sheared steel, P'gh	2.80	2.80	2.60	1.70
Steel hoops, Pittsburgh...	3.10	3.00	3.00	1.75

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

portant consuming centers. A leading sheet mill, whose plant is about 30 miles east of Pittsburgh, has had several cars of sheets rejected that were for delivery to points less than 100 miles west of Pittsburgh. There is not only a great scarcity in the supply of cars but also in motive power. The car situation will no doubt get worse if snow and bad weather come, and this will mean still further delayed deliveries.

Pig Iron.—Prices are steadily going up, and from all appearances the end is not yet. Two sales, aggregating 15,000 tons or more of Bessemer iron, have been made for first quarter at \$29, Valley furnace. Negotiations are now on for probably 25,000 tons. It is doubtful whether any could now be picked up under \$30. Early last week basic sold at \$23 at furnace, while this week it has sold in large lots at \$25. Foundry iron is also higher, No. 2 having sold at \$25 to \$26 at furnace. An inquiry is in the market for 6000 tons of Bessemer for delivery in Canada in the second half of 1917, but it is doubtful if any part of this iron can be obtained in this market. We note a sale of 4500 tons of Bessemer for delivery in first half at \$28, Valley furnace, made on Saturday, Nov. 11. This iron will be shipped to an ingot mold plant in this city, to be made into ingot molds for delivery to a large open-hearth steel plant in western Ohio. We also note a sale of 1000 tons of Bessemer iron at \$28, Valley, made late last week. A sale of 3000 tons of Bessemer was made at about \$27 and 10,000 tons of basic iron to the same consumers on Friday, Nov. 10, at \$24, Valley furnace, all this iron being for delivery in the second half. A sale of 7000 tons of basic was made for first quarter at \$25, Valley furnace, and 2000 tons of basic for delivery this year at \$24. A sale is also reported of 600 tons of Bessemer for second quarter of 1917 at \$30, Valley furnace. A Youngstown open-hearth interest is reported in the market for about 20,000 tons of basic for delivery over first half. There is a very great scarcity of Bessemer and basic iron, and predictions are freely made that prices are going much higher. We quote: Standard Bessemer iron, \$29 to \$30; basic, \$25; malleable Bes-

	Nov. 15.	Nov. 8.	Oct. 18.	Nov. 17.
Sheets, Nails and Wire,	1916.	1916.	1916.	1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	3.65	3.50	3.30	2.25
Sheets, galv., No. 28, P'gh	5.25	5.00	4.40	4.00
Wire nails, Pittsburgh...	2.85	2.85	2.70	1.90
Cut nails, Pittsburgh...	2.80	2.80	2.60	1.80
Fence wire, base, P'gh...	2.80	2.80	2.65	1.75
Barb wire, galv., P'gh...	3.70	3.70	3.55	2.75

Old Material, Per Gross Ton:

	Nov. 15.	Nov. 8.	Oct. 18.	Nov. 17.
Old Material, Per Gross Ton:	1916.	1916.	1916.	1915.
Iron rails, Chicago...	\$25.00	\$23.00	\$20.00	\$15.00
Iron rails, Philadelphia...	23.00	21.00	21.00	17.50
Carwheels, Chicago...	16.50	16.00	13.00	13.25
Carwheels, Philadelphia...	18.00	17.00	15.50	14.00
Heavy steel scrap, P'gh...	21.00	20.00	18.50	16.00
Heavy steel scrap, Phila...	19.50	17.00	16.00	14.50
Heavy steel scrap, Ch'go...	20.50	19.75	16.75	13.50
No. 1 cast, Pittsburgh...	17.00	17.00	16.00	14.00
No. 1 cast, Philadelphia...	18.00	17.00	16.00	14.50
No. 1 cast, Ch'go (net ton)	15.50	15.50	13.50	12.00
No. 1 RR. wrot, Phila...	23.50	23.50	22.00	16.00
No. 1 RR. wrot, Ch'go (net)	21.00	20.00	17.75	13.25

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$7.50	\$7.50	\$5.00	\$2.25
Furnace coke, future...	3.75	4.00	3.50	2.50
Foundry coke, prompt...	7.00	7.00	3.75	3.00
Foundry coke, future...	5.00	5.00	4.00	3.00

Metals,

	Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	32.50	29.50	28.50	19.00	
Electrolytic copper, N. Y.	32.50	29.50	28.50	18.87 1/2	
Spelter, St. Louis...	11.25	10.50	9.50	17.12 1/2	
Spelter, New York...	11.50	10.75	9.62 1/2	17.37 1/2	
Lead, St. Louis...	6.90	6.87 1/2	6.85	5.15	
Lead, New York...	7.00	7.00	7.00	5.25	
Tin, New York...	44.12 1/2	42.25	40.75	42.75	
Antimony (Asiatic), N. Y.	13.00	12.75	13.00	37.50	
Tin plate, 100-lb. box, P'gh	\$6.00	\$6.00	\$5.75	\$3.30	

sem, \$27 to \$28; No. 2 foundry, \$25 to \$26, and gray forge, \$25, all at Valley furnace, the freight rate for delivery in the Cleveland and Pittsburgh districts being 95c. per ton.

Ferroalloys.—A local interest reports a sale of 100 tons of 10 per cent ferrosilicon at \$35 for delivery in first quarter. New inquiry for ferromanganese is heavier, a leading consumer being in the market for 100 tons, equal deliveries in first half. We quote 80 per cent English at \$162 to \$164, seaboard, and 80 per cent domestic at \$160 to \$162 at furnace, freight added to point of delivery. We quote 18 to 22 per cent spiegel-eisen at \$50 to \$55, and 25 to 30 per cent at \$65 to \$75, delivered. We quote 50 per cent ferrosilicon for delivery next year in lots up to 100 tons at \$100; 100 tons to 600 tons, \$99, and over 600 tons, \$98, all per gross ton, f.o.b. Pittsburgh. We quote 9 per cent at \$32; 10 per cent, \$33; 11 per cent, \$34; 12 per cent, \$35; 13 per cent, \$36.50; 14 per cent, \$38.50; 15 per cent, \$40.50, and 16 per cent, \$43. We quote 7 per cent silvery at \$26.50; 8 per cent, \$27; 9 per cent, \$27.50; 10 per cent, \$28; 11 per cent, \$29, and 12 per cent, \$30. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, and Ashland, Ky., all of which have a freight rate of \$2 per gross ton to the Pittsburgh district.

Billets and Sheet Bars.—It is not believed that any soft Bessemer or open-hearth billets or sheet bars could be picked up at this time at less than \$55 per gross ton at mill. It is reported, but not confirmed, that the leading steel interest has about closed a contract for upward of 300,000 tons of forging billets for shells for the Allies, British specifications to apply. It is also stated that another order for 200,000 tons was taken last week by an Eastern mill, and that these two orders are part of an inquiry for 900,000 tons of forging billets that came out about two weeks ago for the Allies, either British or French specifications to apply. A sale of 1000 tons of open-hearth sheet bars for fairly prompt shipment is reported at \$57.50, maker's mills. The \$50 price on billets and sheet bars rolled from soft Bessemer or open-hearth steel seems to have disappeared.

We note a sale of 50 tons of ordinary carbon forging billets for delivery this year at \$76.50, f.o.b. Pittsburgh. We quote base sizes and base carbons of Bessemer and open-hearth billets and sheet bars at \$52.50 to \$57.50 at maker's mill, Youngstown or Pittsburgh. We quote forging billets at \$76.50 for sizes up to, but not including, 10 x 10 in. and for carbons up to 0.25.

Plates.—New orders for steel cars came out very freely the past week. The Pressed Steel Car Company has taken 500 tank cars for the Santa Fé, 500 gondola repairs and 120 box car repairs for the Chesapeake & Ohio, and 350 ore cars for the Northern Pacific. The Camonia Steel Company has taken 1000 steel hoppers for the Philadelphia & Reading and 1000 for the Cambria & Indiana. The Southern Railway has placed about 1300 gondola cars with the Pressed Steel Car Company, and is inquiring for 1500 box cars. The New York Central has applied for authority to issue \$12,000,000 in equipment trust certificates, and the equipment to be purchased includes 4000 steel box cars, 3000 all-steel coal cars, 100 steel passenger coaches, 100 steel baggage cars, 30 multiple unit cars and 10 electric locomotives. The H. C. Frick Coke Company is reported in the market for 1100 steel coke cars and the Baltimore & Ohio Railroad for 5000 cars. The congested condition of the plate mills is steadily getting worse. Local fabricators say they have placed orders for sheared plates with Eastern mills at 4.75c. at mill for delivery in four to six months. The mill price of the Carnegie Steel Company on sheared plates is 3.25c. at mill, but it has no plates to sell for delivery before at least the first quarter of 1918. Other plate mills that can ship in four to six months are quoting 4.50c. at mill, and have taken orders at this price for delivery in second and third quarters of next year. For delivery in two to three months, $\frac{1}{4}$ -in. and heavier sheared plates have sold at 5c. at mill, and in small lots as high as 5.50c. at mill. Any mill that can make the deliveries wanted can get practically any price it asks.

Steel Rails.—Fairly large orders for standard sections are being placed with the Carnegie Steel Company for delivery at its convenience, which means about the third quarter of 1917. The demand for light rails is more active than for some time, the coal companies buying quite freely. We quote 25 to 45 lb. sections at \$47; 16 and 20 lb., \$48; 12 and 14 lb., \$49, and 8 and 10 lb., \$50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at \$33 and of open-hearth \$35, per gross ton, Pittsburgh.

Structural Material.—The chief trouble of fabricators continues to be that of getting material rather than orders. Some fairly large jobs were placed in the past week. The American Bridge Company has taken two steel car floats for the New York, Pennsylvania & Norfolk Railroad at Cape Charles, Va., about 600 tons; 4000 to 5000 tons for new steel buildings for the Firestone Tire & Rubber Company, Akron, Ohio, and has also taken the steel for extensions to buildings of the American Sheet & Tin Plate Company at Farrell and New Castle, Pa. The McClintic-Marshall Company has taken a bridge over the Kennebec River for the Maine Central Railroad 3500 tons; about 2000 tons for additions to the mills of the Inland Steel Company, Indiana Harbor, Ind., and 650 tons for a steel building for the General Electric Company, Lynn, Mass. The Penn Bridge Company has taken 400 tons for a new building for the Co-operative Stove Company, Rochester, Pa., and the Riverside Bridge Company, 400 tons, for a new building for the National Tool Company. We quote beams and channels up to 15 in. at 2.80c. to 3c. at mill, depending on deliveries while small lots from stock for fairly prompt shipment are quoted at 3.25c. to 3.50c., Pittsburgh.

Sheets.—There is an abnormally heavy demand for all grades, especially galvanized, and prices have advanced sharply. There is a great scarcity in galvanized sheets, and consumers that are not covered for first quarter are having trouble in finding mills that will agree to take their orders. The nominal price on No. 23 galvanized sheets of the American Sheet & Tin Plate Company is 5c. at mill, but it is oversold for the first quarter. Some independent mills are quoting

5.50c. and higher for No. 28 galvanized, and the minimum of the market is 5.25c. at mill. On Bessemer black sheets none of the independent mills is quoting less than the price of the leading interest, and some are quoting higher. A distinct shortage in the supply of all kinds of sheets is looming up and promises to be as acute as that which exists in tin plate. Several large sheet mills have allotted their output for the first quarter and sales agents are not permitted to sell more than the quantity named to them. Minimum prices now ruling on sheets in carloads and larger lots are as follows: Blue annealed sheets, Nos. 3 to 8, 3.50c. to 3.60c.; box annealed, one-pass, cold-rolled sheets, No. 28, 3.65c. to 3.75c.; No. 28 galvanized, 5.25c. to 5.50c., and No. 28 tin-mill black plate, 3.40c. to 3.50c., all f.o.b., Pittsburgh.

Tin Plate.—Three or four of the largest makers, in addition to the American Sheet & Tin Plate Company, are out of the market as sellers of tin plate for delivery in the first half, having their entire output sold for that period. For the second half a large amount has been sold by the mills, but at no fixed price, this to be at whatever prices hereafter agreed upon. Some important consumers have not yet fully covered their needs for the first half, and have inquiries out for very large quantities. We quote bright plate, 14 x 20, at \$6 to \$6.25 per base box, f.o.b., Pittsburgh, for delivery in the first half, while small lots from stock bring as high as \$6.50.

Shafting.—Makers are catching up on deliveries to some extent and the discount of 20 per cent off is growing more common. Most large consumers have covered for the first quarter and some for the first half. Specifications against contracts are coming in freely. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots and 10 per cent off in less than carload lots for first quarter and first half of 1917, f.o.b., Pittsburgh, freight added to point of delivery.

Wire Products.—The advance of \$3 per ton on wire nails and wire, effective from Nov. 6, is not only being firmly held, but there is strong talk of another advance that will put wire nails on the basis of \$3 per keg. The domestic demand for wire and wire nails is abnormally heavy, and all the mills are far back in deliveries. The shortage in cars and motive power is holding back shipments and some of the large hardware jobbers are badly in need of larger supplies of both nails and wire. The export demand is also heavy, but the mills are largely passing this up in order to give their full output to their domestic trade. Prices now in effect are as follows: Wire nails, \$2.85, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$2.90 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$2.80; galvanized wire, \$3.50; galvanized barb wire and fence staples, \$3.70; painted barb wire, \$3; polished fence staples, \$3; cement-coated nails, \$2.75, base, these prices being subject to the usual advances for the smaller trade, all f.o.b., Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing are 55 per cent off list for carload lots, 54 per cent for 1000-rod lots and 53 per cent for small lots, f.o.b., Pittsburgh.

Railroad Spikes and Track Bolts.—The spike trade is quiet, the only new inquiry of note being from the Norfolk & Western for 8000 kegs for delivery in the first half. Specifications against contracts are dull and some local spike makers are running only a few machines. The demand for track bolts is fair and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on spikes are as follows:

Standard railroad spikes, $4\frac{1}{2}$ x $9/16$ in. and larger, \$2.65 to \$2.75; railroad spikes, $1\frac{1}{2}$ to $7/16$ in., \$2.75 base; railroad spikes, $\frac{3}{8}$ in. and $5/16$ in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Rivets.—New demand is heavy, and makers say they cannot get out their full output on account of slow

deliveries of steel and shortage in labor. The export demand is also heavy. A shipment of two carloads for the other side of the Atlantic was made last week by a local maker. Prices are likely to be advanced this week. Makers' quotations are: Buttonhead structural rivets, $\frac{1}{2}$ in. in diameter and larger, \$4 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Iron and Steel Bars.—The Carnegie Steel Company is still quoting 2.70c. on steel bars, but is reported to be filled up for all of 1917. Other makers that can ship in the second and third quarters of next year are quoting steel bars all the way from 2.75c. to 2.90c. at mill. The serious car shortage is interfering with shipments and all the mills are much behind in deliveries. We quote merchant steel bars at 2.70c. at mill, with no promise as to delivery, and from 2.75c. to 2.90c. for specified delivery in the second and third quarters. The new demand for iron bars is still heavy and mills are back in shipments. We quote refined iron bars at 2.85c. to 2.90c., and railroad test bars at 2.90c. to 3c., f.o.b. Pittsburgh.

Nuts and Bolts.—It is likely that this week prices will be advanced 10 per cent or more, due to the heavy demand and to the higher cost of steel bars. The export demand is also heavy, but local makers say they need their entire output for domestic consumers. Heavy premiums over regular prices are still being paid for fairly prompt shipment. Discounts in effect at this writing are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. e. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point) 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq. tapped or blank, \$2.70 off list; hex., \$2.70 off. Nuts, c. p. c. and t. sq. tapped or blank, \$2.40 off; hex., \$2.30 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, $\frac{7}{16}$ in. in diameter and smaller, 45, 10 and 5 per cent.

Hoops and Bands.—The nominal price of the Carnegie Steel Company on steel hoops is still 3c. and on steel bands 2.70c., with extras as per the steel bar card, but with no promise whatever as to deliveries. Other makers that can ship during the first half of 1917 are quoting steel hoops from 3.10c. to 3.25c., and steel bands from 2.75c. up to 3c. at mill.

Cold-Rolled Strip Steel.—Further contracts have been made by large consumers for their supply of cold-rolled strip steel for delivery in the first quarter of 1917. None of the makers is willing to sell for delivery beyond that period because of the uncertainty of prices of raw steel and of the labor supply. There is a continued active export demand, for which local makers are not quoting, as their entire output will be needed to fill contracts already taken from domestic trade. We quote on contracts for first quarter delivery \$6.50 to \$7, while on small lots for fairly prompt shipment from \$7 to \$7.50 is quoted. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Merchant Steel.—Some makers have again advanced prices about 10 per cent; others have not yet done so, but it is likely that they will by the end of the week. The new demand is abnormally heavy and all the mills are back in deliveries 8 to 10 weeks or longer. It is said that some large consumers have covered their needs for the first quarter of 1917, but at a very stiff advance over present prices, probably \$5 per ton or more. Nominal prices on small lots are as follows:

Iron-finished tire, $\frac{1}{4}$ x $1\frac{1}{2}$ in. and larger, 2.75c. base; under $\frac{1}{2}$ x $1\frac{1}{2}$ in., 2.85c.; planished tire, 2.90c.; smooth channel tire, $\frac{1}{4}$ to $\frac{1}{2}$ and 1 in., 3c. to 3.10c.; $1\frac{1}{2}$ in. and larger, 3.10c.; toe calk, 3.25c. to 3.50c. base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes, tapered or bent, 3.50c. to 3.75c.; spring steel, 4c. to 4.10c.; machinery steel, smooth finished, 3.10c. to 3.25c., all f.o.b. at mill.

Wrought Pipe.—Effective Wednesday, Nov. 15, the National Tube Company lowered discounts on black and galvanized butt and lap weld iron and steel pipe 1 point, equal to an advance of \$2 per ton. The same advance was also made on all sizes of line pipe. On Nov. 1 discounts on lap-weld sizes of black and galvanized iron and steel pipe had been lowered 1 point, an advance of \$2 per ton, but no change was then made on butt weld. The abnormal demand and the constantly increasing costs of the making of tubular goods of all kinds are the main reasons for the advance. Inquiries are in the market for several oil lines for the Oklahoma district, and for gas lines for the West Virginia and Kansas fields. It is doubtful, however, whether any large contracts for line pipe for reasonably prompt delivery could be accepted at this time as the mills are sold up far ahead. They are restricting quotations on lap-weld iron and steel pipe to regular customers only, being sold up for five to six months, but on butt-weld sizes can make deliveries in a month to six weeks. Two of the larger pipe mills report they have already taken orders this year for double the quantity of tubular goods they sold during all of 1915. Discounts now effective on black and galvanized iron and steel pipe are given on another page.

Wire Rods.—Owing to the heavy demand and the great scarcity in supply of wire rods, mills that can ship out fairly promptly can get almost any prices they ask. We note a sale of 3000 tons of soft steel rods for forward delivery at \$65 per ton, and this is, no doubt, minimum of the market. The domestic demand is heavy, and there is a good deal of export inquiry, much of it from Canada. As high as \$85 has been quoted on high carbon rods. We quote soft Bessemer, open-hearth and chain rods at \$65 to \$70 per gross ton, f.o.b. Pittsburgh.

Boiler Tubes.—Makers of iron and steel locomotive and merchant tubes report they are sold up for six to eight months or longer, and that specifications are very heavy. Premiums over regular prices are freely offered for fairly prompt delivery. Another advance in prices is looked for. Discounts now in effect are given on another page.

Coke.—Some furnace companies that have not yet covered for their supply of coke for the first half of 1917 are still holding off, waiting for lower prices. However, producers and dealers say that coke will be higher before it is lower. A Mahoning Valley furnace interest that has some coke ovens is in the market for 3000 tons per month for the first half, the quantity needed being over what its ovens produce. There are unconfirmed reports that high grade blast-furnace coke has sold for the first half at \$4.25 per net ton at oven. About a month ago some contracts were made at \$3.75, and later one contract for 10,000 tons per month for the first half was reported at \$4. It is not likely that any high grade furnace coke could now be bought on contracts at less than \$4, some producers asking more. Prompt furnace coke continues to command high prices; a sale of 30 to 40 cars has been made at \$7.50 per net ton at oven. Coke labor is still very scarce, one leading producer having 40 ovens idle for lack of men. The scarcity of cars is also getting worse. An accumulation of loaded coal and coke cars on the main lines of the Pennsylvania Railroad between the Connellsville regions and the Pittsburgh district is adding to the shortage in cars, this road evidently needing more motive power. We continue to quote high grade blast-furnace coke for prompt shipment at \$7.50 to \$8 per net ton at oven, and on contracts from \$3.75 to \$4; best grades of 72-hr. foundry coke, \$7 to \$8 for spot shipment, and on contracts from \$5 to \$6. The Connellsville *Courier* gives the output of coke in the upper and lower Connellsville regions for the week ended

Nov. 4 as 408,282 net tons, a decrease over the previous week of 22,049 tons. This decrease was largely due to labor shortage. The high prices ruling for coal are also restricting the output of coke. Several sales of run-of-mine coal have been made at \$6 per net ton at mine. Coal at this price shows a larger profit than coke at \$7.50 to \$8 per ton.

Old Material.—Prices on nearly all classes of scrap have gone up from 50c. to \$1 per ton, and the market shows signs of going higher. A leading consumer has bought 5000 to 6000 tons of selected heavy steel scrap, specifications for which require that no pieces weighing less than 15 lb. will be accepted for delivery at Sharon, Pa., and Alliance, Ohio. It is said the price was \$21 and higher. We also note sales of 500 tons and 300 tons of cast-iron borings at \$8.50; about 1000 tons of old carwheels at \$16.50, and 600 tons of low phosphorus melting scrap at \$25, all per gross ton, delivered at consumers' mills. It is said the available supply of scrap of all kinds is light, and dealers that have it stocked in their yards are holding it for higher prices. Prices now being quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$21.00 to \$22.00
No. 1 foundry cast	17.00 to 17.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	24.50 to 25.00
Hydraulic compressed sheet scrap	16.50 to 17.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	13.50 to 14.00
Bundled sheet stamping scrap	13.00 to 13.50
No. 1 railroad malleable stock	17.50 to 18.00
Railroad grate bars	12.50 to 13.00
Low phosphorus melting stock	24.50 to 25.00
Iron car axles	42.00 to 43.00
Steel car axles	42.00 to 43.00
Locomotive axles, steel	44.00 to 45.00
No. 1 busheling scrap	16.00 to 16.50
Machine-shop turnings	8.50 to 9.00
Old carwheels	16.50 to 17.00
Cast-iron borings	10.00 to 10.50
*Sheet bar crop ends	21.50 to 22.00
No. 1 railroad wrought scrap	21.00 to 22.00
Heavy steel axle turnings	13.00 to 13.50
Heavy breakable cast scrap	15.00 to 15.50

*Shipping point.

Chicago

CHICAGO, ILL., Nov. 15, 1916.—(By Wire.)

With prices climbing steadily, and the available supply of materials falling short of consumers' demands by continually widening margins, the market becomes daily more restricted and abnormal. The mills report another week of bookings greatly in excess of shipments. While the principal orders were for car steel, two railroads bought 17,000 tons of tie-plates and contracts for fabricated building steel totaled 5000 tons. There was less buying of cars than in the preceding week, the largest purchase being 2400 cars by the Illinois Central. The resumption of rail buying for 1918 delivery seems to be imminent, and, as not more than 120,000 tons has already been placed at Chicago, further buying will doubtless run into large figures. The limited supply of plates and sheets is being more keenly felt. Buyers are finding it necessary to content themselves with a fraction of the quantities they undertake to buy. Store prices of sheets have been advanced \$2 per ton. Iron bars are now quoted by the leading mills at 2.65c., Chicago. Following the \$1 advance of last week, cast-iron pipe is up an additional \$3. For No. 2 foundry pig iron \$26 is now asked at Chicago and \$20 at Birmingham, though for last half Southern iron can be had at \$19. Scrap prices are changing daily and are jumping upward at a rate which threatens shortly to outdistance the related prices of finished materials.

Pig Iron.—Inquiry for pig iron, while not so voluminous as at the height of the buying movement, has continued in sufficient quantity to crowd the selling interests. Opportunity is still presented to take orders in amounts up to 5000 tons, and one inquiry contemplates the purchase of 10,000. It is a question whether any maker at Chicago could now sell as much as that

to any one customer. For standard No. 2 foundry, malleable and basic, \$26 is being quoted at Chicago, and higher phosphorus irons are held at \$25 to \$25.50. For the first half the South has very little iron to offer and is asking \$20, Birmingham, but among the large Southern producers there is a disposition to book some iron for the last half and for this delivery \$19 has been done. Sales at Chicago for last half shipment from the South already exceed 10,000 tons. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5...	\$25.75 to \$26.25
Lake Superior charcoal, No. 1.....	26.25 to 26.75
Scotch	26.75 to 27.25
Northern coke foundry, No. 1.....	26.50
Northern coke foundry, No. 2.....	26.00
Northern coke foundry, No. 3.....	25.50
Northern high phosphorus foundry	25.00 to 25.50
Southern coke No. 1 f'dry and 1 soft	24.50 to 25.00
Southern coke, No. 2 f'dry and 2 soft	24.00 to 24.50
Malleable Bessemer	26.00
Basic	26.00
Low phosphorus	40.00
Silvery, 8 per cent	34.50 to 35.50
Bessemer ferrosilicon, 10 per cent	40.50 to 42.50

(By Mail).

Rails and Track Supplies.—It is understood that consideration is being given this week to the question of rails for 1918 delivery by some of the leading mills which, after having booked a few orders, have more recently declined to entertain similar inquiry. The decision to reopen the books is expected to bring with it the announcement of a new price. Buying of track fastenings is going on apace. The Atlantic Coast Line has added 7000 tons of tie-plates to its previous purchase at Chicago, making its total order 13,500 tons, and the Northern Pacific has ordered 10,000 tons. While unable to accept further orders for track bolts, local mills are receiving sizable tonnages of spikes and angle bars. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$52 to \$54, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, 2.25c., Chicago.

Plates.—There is no essential change in the plate situation. It is less easy to place business in the desired quantity, and frequent instances are noted where buyers have had to content themselves with half of the quantity for which inquiry was made. We quote for Chicago delivery of plates from mill at its convenience 3.439c. For prompt shipment we quote 3.689c. to 3.939c. in widths up to 72 in., and for wide plates 4.439c. to 4.689c.

We quote for Chicago delivery of plates from jobbers' stocks, 4c.

Structural Material.—The flood of car buying was somewhat moderated last week, though the placing of 1000 cars each with the Haskell & Barker and Pullman companies by the Illinois Central and its further purchase of 400 ballast cars, the ordering of 1000 cars from Haskell & Barker by the Soo Line, the purchase of 750 additional cars by the Baltimore & Ohio, added to the large number of cars placing of which is imminent, sustain interest. A wider market for fabricated steel appears to have developed, and reports from bridge shops indicate much heavier bookings in October, running up in some instances to 150 per cent of capacity. This condition is also reflected in further buying of plain material by fabricators who had thought themselves fully covered. Contracts reported closed last week included 1450 tons of bridge steel for the Great Northern Railroad, 1200 tons for the Northern Pacific, 325 tons for ore-handling bridges for the Buffalo Union Furnace Company, and 500 tons for a like purpose for the Ford Motor Company, Detroit, all taken by the American Bridge Company; 1100 tons of bridge steel for the Great Northern, placed with the Wisconsin Bridge & Iron Company, and two smaller contracts of 250 tons each. The Harroun Motor Com-

pany, Detroit, has placed a contract for its buildings with the Pan-American Bridge Company, New Castle, Ind. A tighter situation in the supply of plain material is indicated in the substitution in delivery quotations of six months instead of three, by a large independent interest, and the advancing of its price to the basis of 3c., Pittsburgh. We quote for Chicago delivery of structural steel from mill 2.989c. to 3.189c.

We quote for Chicago delivery of structural steel from jobbers' stocks 3.35c.

Sheets.—There remain but a limited number of mills that have any kind of sheets to sell for the first quarter, and the amount of business that is being declined daily is emphatic evidence of the abnormal situation. For such business as the prompt shipment mills are still able to accommodate, prices vary over a considerable range. We quote, for Chicago delivery, blue annealed, No. 16 and heavier, 3.439c. to 3.589c.; box annealed, No. 17 and lighter, 3.839c. to 3.939c.; No. 28 galvanized, 5.689c. to 6c.

Store prices for sheets have been advanced and we quote for Chicago delivery out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 1.8c.; No. 28 black, 4c. to 4.10c.; No. 28 galvanized, 5.50c. to 5.60c.

Bars.—The makers of bar iron have advanced their price to 2.65c., Chicago, and one mill rolling rail carbon steel is quoting 2.75c. for its product, though 2.60c. can still be done. The activity on the part of the implement interests in respect of mild steel bars appears to have run its course. We quote mill shipment, Chicago, as follows: Bar iron, 2.65c.; soft steel bars, 2.889c.; hard steel bars, 2.60c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.35c.; bar iron, 3.35c.; reinforcing bars, 3.35c. base with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting net list.

Rivets and Bolts.—One of the anomalies in the market is found in connection with recent railroad contracts for nuts. Lower prices are stated to have been made for the first half than were made on the contracts for the half year period now drawing to a close. For bolts, the prices are much firmer and the generally prevailing discounts appear to be regularly observed. Recent sales of rivets, among them orders for some 3000 tons, have been made at approximately 4c., Pittsburgh. We quote as follows: Carriage bolts up to $\frac{1}{2}$ x 6 in., rolled thread, 50-5; cut thread, 40-10-2½; larger sizes, 35-2½; machine bolts up to $\frac{1}{2}$ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large size, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, \$2.70 off per 100 lb.; hexagon, \$2.70 off. Structural rivets, $\frac{1}{2}$ to 1½ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices for rivets have been advanced and we quote as follows: Structural rivets, 4.25c.; boiler rivets, 4.35c.; machine bolts up to $\frac{1}{2}$ x 4 in., 50; larger sizes, 40-5; carriage bolts up to $\frac{1}{2}$ x 6 in., 40-10; larger sizes, 35-5; hot pressed nuts, square, \$3, and hexagon, \$3 off per 100 lb.; lag screws, 50-5.

Cast-Iron Pipe.—A sharp advance of \$3 per ton in the price of cast-iron pipe is announced here this week. New business includes inquiries for 300 tons at Winnipeg, Can., and 1500 tons at Duluth. We quote as follows, per net ton, Chicago: Water pipe, 4 in., \$38.50; 6 in. and larger, \$35.50, with \$1 extra for Class A water pipe and gas pipe.

Wire Products.—The careful avoidance of all but the most necessary sales by the principal makers of wire products is limiting activity in these lines. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$3.089; wire nails, \$3.039; painted barb wire, \$3.189; galvanized barb wire, \$3.889; polished staples, \$3.189; galvanized staples, \$3.889; all Chicago.

Old Material.—Trading is general. While none of the principal consumers appears to be in need of any considerable quantities of scrap, little is offered to them at prices approximating the market level that is not taken. The general scarcity of old material is inconsistent with the offering to consumers of any large amounts. Dealers are finding it necessary to observe considerable caution, in view of the rapid advances in price, and short sales are practically eliminated. An especially pronounced scarcity is noted in rerolling

rails. Wrought scrap is again decidedly higher, and busheling has been even more sharply advanced. Quotations are changing so rapidly that the market range is represented by a much wider spread in prices than ordinarily rules. Offerings of railroad scrap continue much below normal, the only list noted for closing this week being those from the Big Four and Chicago & Alton. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton
Old iron rails	\$25.00 to \$26.00
Relaying rails	25.50 to 26.00
Old carwheels	16.50 to 17.00
Old steel rails, rerolling	25.00 to 26.00
Old steel rails, less than 3 ft.	23.50 to 24.00
Heavy melting steel scrap	20.50 to 21.50
Frogs, switches and guards, cut apart	21.00 to 22.00
Shoveling steel	19.00 to 19.50
Steel axle turnings	10.00 to 10.50

	Per Net Ton
Iron angles and splice bars	\$25.50 to \$26.00
Iron arch bars and transoms	25.00 to 25.50
Steel angle bars	18.50 to 19.00
Iron car axles	33.00 to 34.00
Steel car axles	37.50 to 38.00
No. 1 railroad wrought	21.00 to 22.00
No. 2 railroad wrought	20.00 to 21.00
Cut forge	20.00 to 21.00
Pipes and flues	14.50 to 15.00
No. 1 busheling	17.50 to 18.50
No. 2 busheling	12.75 to 13.25
Steel knuckles and couplers	23.50 to 24.50
Steel springs	23.50 to 24.50
No. 1 boilers, cut to sheets and rings	12.50 to 13.00
Boiler punchings	18.00 to 18.50
Locomotive tires, smooth	25.00 to 26.00
Machine-shop turnings	7.00 to 7.50
Cast borings	7.50 to 8.00
No. 1 cast scrap	15.50 to 16.00
Stove plate and light cast scrap	12.25 to 12.75
Grate bars	12.75 to 13.25
Brake shoes	12.50 to 13.00
Railroad malleable	16.50 to 17.00
Agricultural malleable	14.50 to 15.00

Philadelphia

PHILADELPHIA, PA., Nov. 14, 1916.

Pig-iron is quieter, largely because of the greater reluctance of furnace managers to dispose of their product too far into next year, in view of the uncertainties which confront them, particularly with regard to coke. One furnace in the past week bought 50 cars of prompt coke at \$7.50, at oven, and those who have not suffered from interruptions to deliveries are beginning to become apprehensive. The general quotation for any delivery of No. 2 X foundry iron is \$25, though for November or December this might be shaded. Basic has sold for delivery near New York at \$26, delivered. The embargoing by the railroads of New England, Philadelphia and other points is a further source of woriment. In steel the overwhelming demand for plates continues the feature, with 4c., Pittsburgh, still the dominant quotation for tank plates. Ship plates are scarce, and quoted up to 5.50c., Pittsburgh. Shapes are strong at 3c., Eastern mill, or Pittsburgh, according to place of delivery. Sheets are active and higher at 3.659c., Philadelphia, for No. 10 blue annealed. The scrap market has advanced sharply, with most grades moving actively. Only one nearby mill has purchased heavy steel scrap to any considerable extent, but prices outside of this territory are having their effect. For one lot, at least, \$20 was paid, and dealers are asking \$2.50 to \$3 per ton above last week's prices.

Pig Iron.—The market is quieter, not only for the reason that consumers are less excited, but also because producers are even more unwilling to sell far into next year than they were a week ago. Strong in their minds are the uncertainties as to their fuel supply, the cost and supply of ore and securing adequate labor. Were it not for these considerations they would be selling more for last half of 1917 delivery. Some makers are holding back on their first-quarter business, "marking time" as one expressed it, until a more definite policy for the future is determined. As a matter of fact, some of the sellers are as much at sea with regard to the market as are consumers. One furnace was obliged to buy 50 cars of spot coke at \$7.50, at oven, and even those whose coke deliveries have been regular are worried over the outlook. The situation is made more tangled by the Pennsylvania Railroad placing an embargo against Philadelphia, certain New York and Brooklyn terminals and other points, while the New

York, New Haven & Hartford has embargoed its territory, at least so far as Virginia iron is concerned, the latter becoming effective Nov. 9. The Merchants' & Miners' steamers, Norfolk to Boston, also are refusing to take iron. Meanwhile it is not difficult to secure November or December iron at recently quoted prices. As a rule sellers are not differentiating between deliveries in the matter of prices, but concessions might be obtained where spot iron is involved. Both eastern Pennsylvania and Virginia No. 2 X have been taken at \$25, furnace, or \$25.79, Philadelphia, for Northern iron, and \$27.75, Philadelphia, for the Virginia product. One maker of Virginia is reported to be still taking business at \$24, furnace, but a maker of Pennsylvania iron wants \$25.50, furnace, or \$27.40, Philadelphia. No large inquiries are before the trade, but the aggregate of those ranging from 50 to 250 tons is excellent. The last sale of charcoal iron here was made at \$32, Philadelphia, and the makers are out of the market for the first half. Standard low phosphorus has continued extremely active, and the quotation is now up to \$45, Philadelphia. In the past week one interest placed probably 20,000 tons, but must soon call a halt. The result of the national election had no effect on the buying. For delivery near New York, 1000 tons of basic was placed at \$26, delivered. Quotations for standard brands delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry	\$25.00 to \$26.00
Eastern Pa. No. 2 plain	24.50 to 25.50
Virginia No. 2 X foundry	26.75
Virginia No. 2 plain	26.50
Gray forge	23.50 to 24.50
Basic	26.00
Standard low phosphorus	45.00

Iron Ore.—In the week ended Nov. 11 the following arrivals of foreign ore were reported at this port: From Chile, 3400 tons; Sweden, 4946 tons. An effort has been made in the week to place a cargo of North African ore, with what success has not been ascertained. It is a question who can buy with ocean freights where they are.

Ferroalloys.—Domestic 80 per cent ferromanganese can be had at \$165, delivered over the remainder of the year, and around \$160 for the first half. No prompt imported is being offered, but for the first half \$164, seaboard, continues to be quoted. Imports which are used to fill contracts are coming with fair regularity. Spot ferrosilicon is scarce, and contract terms have not been entirely formulated. It is expected that they will range from \$100 to \$110, Pittsburgh. An importation of a quarter of a ton of ferrotantalum arrived here last week.

Plates.—Most of the mills continue to quote 4.159c., Philadelphia, for tank plates, a figure which might be shaded under the right circumstances. Ship plates are stronger than ever, and the demand is more insistent for deliveries far into next year. One mill quotes 4.909c., Philadelphia, on tank steel, and 10.40c., Pittsburgh, for marine boiler steel. For ship plates, 5.50c., Pittsburgh, or 5.659c., Philadelphia, is quoted. Many large inquiries, more or less tentative in character, specify deliveries through 1917, and in a few cases into 1918. In one case 6c., Pittsburgh, was quoted on 6000 tons for last half delivery, with the idea of keeping business away. The many recent car contracts have comfortably filled the mills with orders for universal plates.

Bars.—Quotations for steel bars range from 2.859c. to 3.159c., Philadelphia, the lower figure applying only to business done with old and preferred customers. Iron bars are unchanged at 2.659c., Philadelphia, for car-load lots.

Billets.—Open-hearth rerolling billets are stronger because of the sold-up condition of the makers and are now held at \$55. Forging steel is unchanged at \$65 to \$75.

Sheets.—The market is very active, and No. 10 blue annealed sheets are stronger at 3.659c. to 3.909c., Philadelphia.

Structural Material.—Quotations are quite uniform at 3.159c., Philadelphia, although one mill regulates its base of 3c., in accordance with the territory to which delivery is made, using either Pittsburgh or mill as the

freight rates are favorable or unfavorable. The demand for miscellaneous material is good. The Victor Talking Machine Company, Camden, N. J., will require 400 to 500 tons, on which bids are to be taken Nov. 15.

Coke.—Spot furnace coke is quoted at \$7.50 to \$8 per net ton at oven, and noteworthy sales have been made at the lower price. A contract for the first half is reported to have been placed at \$6.50 per ton, while the nominal quotations for the next year are \$3.75 to \$4 per ton. Spot foundry ranges from \$9 to \$10 per net ton at oven. Makers are not desirous of contracting, at the nominal level of \$6 to \$7 per ton. As disclosed by the iron market, the situation is a most disquieting one. Freight rates from the principal producing districts are as follows: Connellsburg, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—Though as yet there have been but moderate sales of heavy melting steel, with only one mill active in the market, the demand outside of this district continues strong, and dealers are buying. Advances have been sharp and up to \$20 has been paid for heavy steel. The entire list is active, and still higher prices are predicted. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel	\$19.50 to \$20.00
Old steel rails, rerolling	24.00 to 25.00
Low phosph. heavy melting steel scrap	27.00 to 28.00
Old steel axles (for export)	40.00
Old iron axles (for export)	40.00
Old iron rails	23.00 to 24.00
Old carwheels	18.00 to 19.00
No. 1 railroad wrought	23.50 to 24.00
Wrought-iron pipe	17.00 to 17.50
No. 1 forge fire	14.00 to 14.50
Bundled sheets	14.00 to 14.50
No. 2 busheling	10.50 to 11.00
Machine-shop turnings	9.50 to 10.00
Cast borings	11.50 to 12.00
No. 1 cast	18.00 to 18.50
Grate bars, railroad	14.00 to 14.50
Stove plate	14.00 to 14.50
Railroad malleable	16.50 to 17.00

Birmingham

BIRMINGHAM, ALA., Nov. 13, 1916.

Pig Iron.—The long-predicted \$20 iron became a reality in several purchases during the week ended Nov. 11, and on that day the price was made minimum for all deliveries by the leading interest. The largest foundry iron producer having already marked its price up to that, and these two being the only concerns in the open market, this thoroughly established the \$20 basis. As much as 10,000 tons for Middle Western delivery sold at \$19 around Thursday, while a lot of high silicon went at \$23, the equivalent, based on the analysis of the metal, of \$21 for No. 2 foundry. The formal advance to \$20 was made Saturday at noon. Charcoal iron joined the advancing column by rising to \$25, with sales made at that figure. What the spot price may be at any time depends upon the status of the consumer and the attitude of the furnaceman. It is not at all unlikely that there will be sales in the immediate future at from \$22 to as high as \$25 if the seller chooses. Sales during election week averaged around \$18.50 to \$19. The formal rise from \$18.50 to \$20 as a general market basis took place from Friday afternoon, 10th, to Saturday noon, 11th. The iron movement is much better. Two of the largest interests report stocks going down as compared with output. This will serve to do away rapidly with the something over 200,000 tons of free foundry iron in yards at the beginning of the month. As a rule, makers appear to have sold between 50 and 60 per cent of capacity through the first half of 1917—some more than that. One interest declines to make quotations at all. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft	\$20.50
No. 2 foundry and soft	20.00
No. 3 foundry	19.50
No. 4 foundry	19.25
Gray forge	19.00
Basic	20.00
Charcoal	25.00

Cast-Iron Pipe.—Very little new business has been received, although several contracts are reported under consideration (in apprehension of further rises in price).

on the part of those who must have pipe soon. Prices have been marked up \$1 per ton with some reluctance, owing to the fear of cutting down business, but further advances may ensue. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$30; 6-in. and upward, \$27, with \$1 added for gas pipe and special lengths.

Coal and Coke—Steam coal is going readily at \$2.50 to \$3 per ton on new business, sometimes higher. Territory never taking Alabama coal heretofore has applied for it. Mexico has taken several hundred cars of smelter coke. Contract foundry coke is still moving at \$4.25 to \$4.50 per net ton at oven, but when the makers have a surplus over specifications on delivery, they get as much as \$5. Consumers heretofore slow about taking Alabama makes are becoming used to them. Furnace coke is selling at \$3.50 to \$3.75 per ton.

Old Material—There is much activity in the market, with an all round demand for all kinds of material. Resumption at a local rolling mill has eaten up the wrought scrap supply, and mills in Chattanooga, Atlanta and Alabama City, Ala., are taking most of the steel scrap. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles.....	\$26.00 to \$30.00
Old steel rails.....	13.00 to 13.50
No. 1 wrought.....	17.00 to 18.00
Heavy melting steel.....	12.50 to 13.00
No. 1 machinery cast.....	12.00 to 12.50
Carwheels.....	11.50 to 12.00
Train carwheels.....	11.00 to 11.50
Stove plate and light cast.....	10.00 to 10.50

Cincinnati

CINCINNATI, OHIO, Nov. 15, 1916.—(By Wire.)

Pig Iron.—The national election had only a temporary effect on the market and prices continue to advance. A leading maker in southern Ohio to-day named \$25, Ironton, on basic, malleable and No. 2 foundry. This is an advance of \$2 over prices quoted Nov. 3. Southern iron has also gone up, and while some business was done last week as low as \$18.50 for first half shipment, \$20, Birmingham, is the present usual quotation. Iron can be bought for shipment through the last half of next year at this figure. Quite a number of sales have been made of Southern iron for last half delivery, and a number of fortunate buyers were lately able to cover for their requirements next year at prices ranging all the way from \$18.50 to \$21, Birmingham, and some special iron has been sold as high as \$22. In the Hanging Rock district the furnaces are filled for the first half, and the Virginia furnaces on that delivery have withdrawn from the market entirely, so that Southern producers appear to have control of the situation for at least eight months hence. Indiana melters have contracted for different tonnages of Southern iron and have also bought some Northern iron for last half shipment. A southern Ohio foundry purchased 1000 tons of Northern iron for last half, and 2000 tons of malleable was bought by a central Ohio manufacturer, while a like quantity went to an Indiana consumer, all for the delivery mentioned. Lake Superior charcoal has been more active, but the largest reported sale is 500 tons to a Michigan firm. Recent purchases of Ohio silvery irons have put the furnaces in that district in a more independent position, and based on an 8 per cent analysis quotations range all the way from \$30 to \$32 at furnace. Conflicting reports are given as to stocks in the South but it is known that they are lower than for some time. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$23.40 to \$23.90
Southern coke, No. 2 f'dry and 2 soft.	22.90 to 23.40
Southern coke, No. 3 foundry.....	22.40 to 22.90
Southern coke, No. 4 foundry.....	21.90 to 22.40
Southern gray forge.....	21.40 to 21.90
Ohio silvery, 8 per cent silicon.....	32.26 to 33.26
Southern Ohio coke, No. 1.....	25.76 to 26.26
Southern Ohio coke, No. 2.....	25.26 to 25.76
Southern Ohio coke, No. 3.....	24.76 to 25.26
Southern Ohio malleable Bessemer.....	25.26 to 25.76
Basic, Northern.....	25.26 to 25.76
Lake Superior charcoal.....	24.20 to 25.20
Standard Southern carwheel.....	26.40 to 26.90

(By Mail)

Coke.—As far as prompt coke is concerned, the market has so many different angles to consider that a proper determination of prices is almost impossible. No buying of either furnace or foundry coke has been reported lately, except by consumers who have not been able to get shipments on existing contracts on account of car shortage. Some Connellsburg foundry coke has sold in this way as high as \$8.50 per net ton at oven for prompt shipment, and it is reported that \$1 above this was paid for coke loaded on cars. A few sales of furnace coke were also made on almost an equal basis. From \$5 to \$6 a ton is generally named on foundry coke at oven in all districts for shipment next year.

Finished Material.—The local store price on No. 10 blue annealed sheets has been advanced to 3.90c., and the nearby mills are quoting No. 28 galvanized at 5.65c. and No. 28 black at 4.15c., f.o.b. Cincinnati or Newport, Ky. Some business is reported at the advanced quotations, and it is yet simply a question of being able to make deliveries. Jobbers are now quoting wire nails at \$3.15 per keg base and barb wire at \$4.10 per 100 lb. Plates are unchanged at 4.10c. from stock; steel bars, 3.45c., with 15c. per 100 lb. added for twisted reinforcing concrete bars; rounds and hexagons, 2 in. and over, 4c.; small structural shapes, 3.35c.; cold-rolled shafting, 10 per cent plus list, but in some cases it is not possible to make prompt shipment of orders received for rush shipment. Hoops and bands are hard to get at any price for nearby delivery. This is also the case on many finished material articles. The railroad track supply business is good, but new orders are mainly for rush supplies.

Old Material.—Further advances have been made averaging about 25c. per ton on all classes of scrap. Business is good and buying has been stimulated instead of retarded by advancing prices. The foundries are substituting more scrap for pig iron. The rolling mills are also buying quite heavily, as compared with this time last year. Taken as a whole the market is now more in the sellers' hands than at any period for some time. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

<i>Per Gross Ton</i>	
Bundled sheet scrap	\$12.75 to \$13.25
Old iron rails	20.00 to 20.50
Relaying rails, 50 lb. and up	24.50 to 25.00
Rerolling steel rails	20.25 to 20.75
Heavy melting steel scrap	18.00 to 18.50
Steel rails for melting	17.50 to 18.00

<i>Per Net Ton</i>	
No. 1 railroad wrought	\$18.25 to \$18.75
Cast borings	5.75 to 6.25
Steel turnings	5.75 to 6.25
Railroad cast	14.50 to 15.00
No. 1 machinery cast	16.25 to 16.75
Burnt scrap	10.00 to 10.50
Iron axles	30.25 to 30.75
Locomotive tires (smooth inside)	24.00 to 24.50
Pipes and flues	12.00 to 12.50
Malleable and steel	13.75 to 14.25
Railroad tank and sheet	11.00 to 11.50

St. Louis

ST. LOUIS, Mo., Nov. 13, 1916.

Pig Iron.—The excited state of the market at this point continued through the past week. Buying was less in volume, chiefly because of the difficulty in closing transactions rather than because of a slackening up of demand. Foundrymen are coming into the market for large and small amounts and for nearby as well as deferred deliveries. Furnaces are accepting little beyond the first half of 1917. Sales of the week aggregated close to 15,000 tons, mostly No. 2 foundry iron. Sales were made as high as \$21.50 for No. 2 Southern, Birmingham basis, with \$21 practically accepted as the general price.

Coke.—Sharp calls for coke for immediate delivery appeared, partly because of urgent need and in part to assure against irregularity of delivery owing to car shortage. On such transactions as were closed \$8.50 per ton, Connellsburg ovens, was paid for 72-hr. coke. To-day the price of \$9.50 for 72-hr. foundry coke was being made. Efforts of foundrymen to obtain anticipation of shipments of coke contracted for first half were futile. In one case a foundryman with a contract at

\$3 paid \$8.50 for some spot coke. By-product coke is being held on parity with bee-hive product and with as little disposition to contract ahead.

Finished Iron and Steel.—There was plenty of desire to enter orders and make contracts, but the mills refused to take on new business except under special circumstances growing out of past relations with the customer or other particular features. Warehouse business is very good and we quote for stock out of warehouse as follows: Soft steel bars, 3.40c.; iron bars, 3.30c. to 3.35c.; structural material, 3.40c.; tank plate, 4.05c.; No. 10 blue annealed sheets, 3.85c.; No. 28 black sheets, cold rolled, one pass, 4.35c.; No. 28 galvanized sheets, black sheet gage, 5.95c.

Old Material.—The scrap market, due to the sharp demand and the apparent shortage of material, is excited and strong at better prices in many instances. Steel mills, rolling mills and foundries are taking all they can get, while dealers are in short supply and bidding freely for all that is offered. Something of a flurry in carwheels developed, and investigation showed that about all the local supply was in consumers' hands, probably three-quarters of that in one consumer's possession. The total holdings are about 100,000 tons, with little if any more than 5000 tons in dealers' hands and practically none coming out from the railroads. Lists out include 200 tons from the Cotton Belt; 600 tons from the Chicago & Alton; 400 tons from a local industry; 1800 tons from the Big Four; 3000 tons from the Southern Railway, and 600 tons from the Nashville, Chattanooga & St. Louis, and 2500 tons from the Missouri, Kansas & Texas. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton		
Old iron rails	\$22.00 to \$22.50	
Old steel rails, rerolling	23.00 to 23.50	
Old steel rails, less than 3 ft.	22.50 to 23.00	
Relaying rails, standard section, subject to inspection	25.00 to 27.00	
Old carwheels	16.50 to 17.00	
No. 1 railroad heavy melting steel scrap	20.50 to 21.00	
Heavy shoveling steel	16.50 to 17.00	
Frogs, switches and guards cut apart	20.50 to 21.00	
Bundled sheet scrap	10.00 to 10.50	
Per Net Ton		
Iron angle bars	\$21.00 to \$21.50	
Steel angle bars	18.50 to 19.00	
Iron car axles	32.50 to 33.00	
Steel car axles	35.00 to 35.50	
Wrought arch bars and transoms	25.50 to 26.00	
No. 1 railroad wrought	20.50 to 21.00	
No. 2 railroad wrought	19.00 to 19.50	
Railroad springs	19.00 to 19.50	
Steel couplers and knuckles	22.00 to 22.50	
Locomotive tires, 42 in. and over, smooth inside	24.50 to 25.00	
No. 1 dealers' forge	17.00 to 17.50	
Cast-iron borings	9.00 to 9.50	
No. 1 busheling	17.00 to 17.50	
No. 1 boilers, cut to sheets and rings	13.50 to 14.00	
No. 1 railroad cast scrap	13.50 to 14.00	
Stove plate and light cast scrap	10.00 to 10.50	
Railroad malleable	14.00 to 14.50	
Agricultural malleable	12.00 to 12.50	
Pipes and flues	14.50 to 15.00	
Heavy railroad sheet and tank scrap	13.50 to 14.00	
Railroad grate bars	11.50 to 12.00	
Machine shop turnings	9.00 to 9.50	

Cleveland

CLEVELAND, OHIO, Nov. 14, 1916.

Iron Ore.—No action has yet been taken toward establishing next season's prices. They may be announced within a day or two or the matter may be delayed until navigation closes. The ore movement has slowed up as a result of cold weather on the ranges. Zero temperature was reached at some points, and certain railroads have held up shipments from the mines, not allowing the ore to go forward unless a boat would be available without delay to take on the cargo. There is no improvement in the car situation at the lower Lake docks, boats still being delayed considerably. There has been some additional chartering at the \$1 rate. With only about three weeks before the close of navigation, ore firms will keep boats in operation as long as the weather permits, to clean up their shipments. We quote 1916 prices as follows, delivered lower Lake ports: Old range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old range non-Bessemer, \$3.75; Mesaba non-Bessemer, \$3.55.

Pig Iron.—Further advances have been made on all grades. Sales of considerable tonnages of foundry iron were made during the week by Cleveland and Valley furnaces at \$25, at furnace, and quotations now range from \$25 to \$26 for both first and last half deliveries. Prices still show an upward tendency, and it is possible that a quotation lower than \$26 can no longer be secured from local furnaces. Sales of Bessemer were made late in the week at \$28 but present quotations range from \$29 to \$30, Valley furnace. Basic sales are reported at \$25, both for early shipment and first half. A northern Ohio consumer reported in the market for 4000 tons of basic for early shipment is understood to have covered for at least part of this iron. Some producers are now asking \$26 and higher for basic. Furnace companies are showing considerable anxiety over the car situation, and the fear is expressed that it might be necessary to slow down or possibly bank some furnaces because of the inability to secure coke for furnaces or coal for by-product plants. Southern iron is fairly active. Sales of a considerable tonnage in small lots are reported at \$20, Birmingham, for last half. Some furnaces have withdrawn from the market for delivery before July, and one Tennessee interest is now asking \$23 for last half. Southern producers are behind on shipments owing to their inability to secure cars, some of the Southern railroads refusing to allow cars to leave their own lines. In silvery iron we note the sale of 1500 tons of 6 per cent to a northern Ohio consumer for the last half, at \$29, at furnace. We quote, delivered Cleveland, as follows:

Bessemer	\$29.95
Basic	25.30
Northern No. 2 foundry	\$25.30 to 26.30
Southern No. 2 foundry	24.00
Gray forge	24.95
Jackson Co., silvery, 8 per cent silicon	31.62
Standard low phos., Valley furnace	43.00 to 44.00

Coke.—Corrigan, McKinney & Co., Cleveland, started up half of their new by-product coke plant last week, placing in operation two batteries of 102 ovens. The remaining two batteries will be started shortly. Foundry coke is generally quoted at \$8 to \$8.25, per net ton at oven, for prompt shipment. However, it is stated that some makes can be secured at about \$7.50.

Finished Iron and Steel.—The heavy buying by railroads is making the situation tighter in finished products. A large volume of new business could be placed with the mills in position to take on additional tonnage. The Nickel Plate Railroad has bought 1000 box cars, and is in the market for 500 automobile cars in addition to those recently placed, and for 10 Mikado type and 10 switching locomotives. The New York Central Lines have an inquiry out for 11,000 car and tender axles for replacements. A Cleveland company has taken an additional order for portable railroad track for the French Government, and has placed 2500 tons of light rails to be used in filling that order. The situation in the Lake shipyards that are handicapped by the non-delivery of steel has become more serious. With yards well filled for 1917, a large number of inquiries are pending for boats for 1918 delivery, mostly for use on the Eastern coast. The demand for plates has increased, being particularly heavy from the shipyards. Local prices are higher, quotations by Cleveland mills now ranging from 4c., Pittsburgh, for lighter gages, to 4.50c. for heavy plate. Some business is being taken by a local selling agency in first quarter plate contracts at 3.50c. In structural lines a great deal of new work is in prospect, although none has been placed recently requiring round tonnages. Local fabricating shops are well filled, and fabricating material here is being quoted at \$100 to \$110 a ton, erected. The demand for sheets for early shipment is heavy, but few consumers want to contract at present prices for future requirements. Black sheets are quoted as high as 4.25c. to 4.50c., and one Ohio mill has advanced its price on galvanized sheets to 6c., the same as its warehouse price. We quote sheets at 3.75c. to 4c., Ohio mill, for No. 28 black; 3.50c. to 3.75c. for No. 10 blue annealed, and 5.50c. to 5.75c. for No. 28 galvanized. Bar iron is firmer, and is now quoted at 2.75c. to 2.80c., Pittsburgh. Warehouses are buying material wher-

ever they can, at high prices, to fill up their stocks, which are badly depleted. Warehouse prices are: Steel bars, under 2 in., 3.50c.; over 2 in., 4c.; plates, 4.10c.; structural material, 3.60c.; iron bars, 3.45c.; No. 28 black sheets, 3.90c.; No. 10 blue annealed sheets, 3.75c.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, and considerable business is still being placed for first half. An advance this week is not improbable. Rivet prices are unchanged at 4c., Pittsburgh, for structural and 4.10c. for boiler. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and $2\frac{1}{2}$; larger or longer, 30 and $2\frac{1}{2}$; machine bolts with h. p. nuts, $\frac{3}{8}$ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50, larger and longer, 40 and 5; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, \$2.70 off the list; hexagon h. p. nuts, blank or tapped, \$2.70 off; c. p. c. and t. sq. nuts, blank or tapped, \$2.40; hexagon nuts, all sizes, \$2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The market is strong, and further advances have been made on grades that are in any way active. Most consumers have large stocks, and are not actively in the market. However, there is considerable trading between dealers who are covering on short contracts. Dealers are also contracting for the output of large producers who are allowing their material to go at present prices. Heavy melting steel scrap has advanced 50c. per ton in the local market, and is quoted at \$20 to \$20.50 for delivery to Valley mills. Busheling, which recently stiffened up, has further advanced, and local sales have been made as high as \$16 per net ton. Borings and turnings are in better demand than for some time, and have further advanced about 25c. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$19.50 to \$20.00
Steel rails, rerolling	22.00
Old steel rails under 3 ft.	22.00 to 22.50
Iron rails	23.00 to 24.00
Steel car axles	40.00 to 42.00
Heavy melting steel scrap	19.00 to 19.50
Carwheels	15.50 to 16.00
Relaying rails, 50 lb. and over	25.00
Agricultural malleable	14.50 to 15.00
Railroad malleable	19.00 to 19.50
Steel axle turnings	12.50 to 13.00
Light bundled sheet scrap	12.00 to 12.25

Per Net Ton	
Iron car axles	\$36.00 to \$37.00
Cast borings	7.25 to 7.35
Iron and steel turnings and drillings	6.25 to 6.50
No. 1 busheling	15.50 to 16.00
No. 1 railroad wrought	19.50 to 20.00
No. 1 cast	15.75 to 16.25
Railroad grate bars	12.50 to 13.00
Stove plate	12.50 to 13.00

Buffalo

BUFFALO, N. Y., Nov. 14, 1916.

Finished Iron and Steel.—The last week has shown some slackening in market activity. Prices are nominal, and it is found that where sales are made advances are asked in many instances over the nominal market price. Large additional inquiries for wire rods developed in the Canadian market during the week; but as far as can be learned, manufacturers on this side of the line were unable to entertain any of the inquiries. Jobbers who were recently reporting heavy stocks of nails on hand are now pressing the mills for deliveries, stating that there is a more pronounced demand than they have known for many years.

Pig Iron.—Sales the past week were not so large as the previous week—not on account of diminishing interest or demand, but owing to diminution of unsold capacity of furnaces. While inquiries are being received in large volume, the iron required is not available. Buffalo producers are now in such shape that they cannot even supply the territory tributary to their furnaces, which causes consumers to go to other producing districts in search of their pig-iron requirements. The inquiries received cover practically all periods from now over the year 1917, and one producing interest has several inquiries for deliveries extending into 1918. The price range varies according to the forward sold-up conditions of furnaces. The interest having the lowest range reports it as from \$25 to \$27.50 at furnace for

the various grades of foundry iron, with Bessemer and basic ruling at higher prices. The other producers state they are holding at \$27 to \$27.50 minimum, according to delivery. One furnace reports the sale of some high sulphur malleable at \$25, furnace. The bulk of sales made were for first half delivery, with some running into second half. We quote as follows for last quarter and first half delivery, f.o.b. furnace, Buffalo:

High silicon irons	\$24.00 to \$28.00
No. 1 foundry	27.00 to 28.00
No. 2 X foundry	27.00 to 28.00
No. 2 plain	27.00 to 27.50
No. 3 foundry	27.00 to 27.50
Gray forge	27.00 to 27.50
Malleable	27.00 to 28.00
Basic	27.00 to 28.00
Bessemer	30.00 to 31.00
Charcoal, according to brand and analysis	27.00 to 27.50

Old Material.—The heavy demand from Western markets has caused prices to be again advanced on practically all grades. One local consumer of steel scrap has purchased 15,000 to 20,000 tons of various grades, covering requirements for some months ahead. No. 1 cast scrap is strong. Some small business has been done in carwheels, but stocks in yards are held for higher prices. Borings and turnings are moving freely at advanced prices. We quote dealers' asking prices as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$19.25 to \$20.00
Low phosphorus billet and bloom ends	24.00 to 25.00
No. 1 railroad wrought	21.50 to 22.25
No. 1 railroad and machinery cast	19.00 to 20.00
Steel axles	35.00
Iron axles	35.00
Carwheels	17.00 to 18.00
Railroad malleable	18.00 to 18.50
Machine shop turnings	8.50 to 9.00
Heavy axle turnings	13.50 to 14.00
Clean cast borings	9.50 to 10.00
Iron rails	20.50 to 21.00
Locomotive grate bars	14.00 to 14.50
Stove plate (gross ton)	14.25 to 14.75
Wrought pipe	14.50 to 15.00
No. 1 busheling scrap	16.00 to 16.50
No. 2 busheling scrap	12.50 to 13.00
Bundled sheet scrap	13.50 to 14.00

San Francisco

SAN FRANCISCO, CAL., Nov. 7, 1916.

The small consuming and jobbing trade is comparatively quiet, and local activities were interrupted by election day, when most large shops and warehouses closed. The latest mill advances have disturbed this market considerably, causing general uncertainty as to resale values; and most important orders are put up to the mills before acceptance. Some activity is noted on the part of large buyers whose requirements can be calculated far into the future, but in most quarters new buying is limited. Export demand shows no abatement.

Bars.—Foreign demand continues very strong, and the jobbing movement in nearby territory shows some improvement, though the call for reinforcing bars is falling off a little with the approach of winter. Manufacturers' requirements are comparatively large, both in steel and iron bars, and specifications are coming out well.

Plates.—New business is not especially active, though some export business is going through, and more could easily be taken if it were desired. Consuming industries continue extremely busy, but their principal requirements are covered by contracts for some time to come. Deliveries on contracts are large, both for shipbuilding and tank work.

Sheets.—The activity in corrugated sheets appears to be about over for the season, and flat galvanized also are rather quiet at present, though there was some movement in anticipation of the last advance. The high prices greatly hamper the consuming trade in general, though purchases of both galvanized and blue annealed for manufacturing purposes keep up in good shape.

Structural Material.—A number of small fabricating contracts have recently been placed with local shops, but few important jobs are appearing. Fabricators are fairly well covered as regards work now in hand, but have not anticipated their needs very far ahead. The price of steel has for some time tended

strongly to retard building operations. The Baker Iron Works, Los Angeles, has a 1000-ton contract for a 12-story office and theater building, at Third Street and Broadway, and a small job on Winston Street. Provision has been made for a steel bridge on the Lewis River at LaCenter, Wash., and bids will be taken Nov. 15 for a 180-ft. span at Marshfield, Ore.

Wrought Pipe.—The new advance on lap-weld pipe has had little effect on conditions here, as the oil situation is favorable for further development, and the oil field movement keeps up fairly well, though much less active than in September. Butt-weld sizes remain dull, owing apparently to lack of building activity.

Cast-Iron Pipe.—Prices have again advanced, being quoted here at \$38 per net ton for 6-in. and over; \$41 for 4-in., and \$1 extra for class A and gas pipe. Sarta Barbara, Cal., has let a small contract for 4 and 6 in. pipe, and small orders from private interests have been fairly numerous for the last fortnight, but there is nothing of special importance in the market.

Pig Iron.—Foundries in practically all parts of the State are quite busy, the local plants being more steadily occupied than before, and the tonnage of iron used is large. Stocks on hand, however, are sufficient to cover the remainder of the year, and little new business is going through, notwithstanding the prospect of higher prices. Values are already advanced quite sharply, No. 1 Southern being quoted at \$28 to \$29 per gross ton.

Coke.—Local prices are entirely nominal, owing to the sudden changes in prices at the ovens. Some consumers have placed large contracts, but most of the foundries still have a fair supply, and are disposed to hold off.

Old Material.—The larger buyers of steel scrap, while getting some material on old contracts, are taking more interest in the market, with indications of larger purchases shortly. This, with the Eastern situation, has caused a much stronger feeling, and holders of large stocks are asking as high as \$14, with some business, for the most desirable offerings, while \$10 per gross ton is about the inside figure. Cast-iron scrap also shows a little more firmness, with an active demand from melters, ordinary offerings being quoted at about \$16 per net ton.

New York

NEW YORK, Nov. 15, 1916.

Pig Iron.—New export call for 25,000 to 30,000 tons of foundry and steel-making irons, chiefly for France, and two inquiries for 1917 iron from large consumers, together amounting to 30,000 to 35,000 tons, are the chief features of pending business. Export Bessemer iron, on \$30 to \$33 ocean freight, now comes to \$62 to \$65 at European port. Of the three lots of iron, together amounting to about 5000 tons, which were pending last week in this district, two have been closed. In one case about 2000 tons was taken by an agricultural foundry on the Hudson River, in another 1500 to 1800 tons, delivery in the second and third quarters of next year, was bought by a New Jersey melter. A Jersey City inquiry for about 2000 tons for second half is still pending. On Virginia iron the leading producer is again out of the market after having made sales in the past week of \$23.50, \$24 and \$25 at furnace for No. 2 X. Pennsylvania furnaces have been in better shape than those of other districts to take on business and their quotations have ranged from \$23.50 to \$24.50 at furnace for the first half, while some of them are now asking \$26 for second half. There is no particular demand for spot iron. On the surface of things, considering that the New Haven road announced an embargo on pig iron, effective Nov. 10, it might be expected that early delivery iron would be in demand; but the New England foundries with their plentiful experiences of New Haven embargoes this year are carrying good stocks in their yards. Buffalo furnaces have relatively little iron to sell for forward delivery. Some sales have been made there at \$27.50 and \$28 at furnace. In Virginia a considerable lot of iron held by banking interests is coming out a little at a time. Prices

on Alabama iron vary. Up to Saturday one interest there was selling at \$18 to \$19 for No. 2 foundry. On warrants \$19.50 was due late last week, but \$20 to \$21 is asked to-day, with little doing. One of the large pending lots is the renewal of the International Steam Pump Company's inquiry of more than two months ago for about 16,000 tons for the second half of next year. On spot foundry coke sales have been made in the past week at \$9 to \$11 and even higher. We quote at tidewater for early delivery: No. 1 foundry, \$25.50 to \$26.50; No. 2 X, \$25 to \$25.50; No. 2 plain, \$24.50 to \$25; Southern iron at tidewater, \$25 to \$26 for No. 1 and \$24.50 to \$25.50 for No. 2 foundry and No. 2 soft.

Ferroalloys.—The ferromanganese market is quiet but firm at \$164, seaboard, for the British and \$160 to \$165, delivered, for the domestic product. There have been a few inquiries and sales of small lots in the past week. Arrivals are reported to be normal under present conditions. A large importer of the British alloy has contracted to sell the output for all of 1917 of a western Pennsylvania furnace making ferromanganese. Spegeleisen is more active with sales for both nearby and forward delivery. The quotation for 20-per cent is now \$47 to \$50, furnace, against \$45 a week ago. Ferrosilicon, 50 per cent, is in active demand, with deliveries on specifications hard to meet.

Structural Material.—A fair amount of work has been put under contract; fabricators still have several months operations arranged for, but new inquiries have let down. In spite of this last fact, the 2.70c. Pittsburgh price for any delivery has disappeared, following the uptrend of other forms of steel and because of the pre-emption of steel for other purposes in the case of some mills and the use of structural rolls for billets in the case of other mills. The McClintic-Marshall Company has been awarded 3300 tons for a bridge over the Kennebec River for the Maine Central, 1200 tons for the Joseph Dixon Crucible plant in Jersey City and 750 tons for the General Electric Company at Lynn, Mass. The American Bridge Company has been awarded 1000 tons for the Watervliet Arsenal, 300 tons for the General Electric at Pittsfield, Mass., and will probably supply the 7000 tons for the Thames River bridge of the New Haven road. The Phoenix Bridge Company is to furnish the 1200 tons for the Jersey Central station at Newark and has closed for 250 tons for the Philadelphia Suburban Gas & Electric Company. Other awards embrace 2200 tons for the Broad No. 2 telephone exchange to Eidlitz & Ross; 600 tons for the Kenyon pier, Brooklyn, to Post & McCord; 1200 tons for the Rodin studio building, Fifty-seventh Street and Seventh Avenue, to Hinkle Iron Company; 400 tons for the Kings County Court House to the Guerber Engineering Company; 700 tons for the Southern Railway to the Virginia Bridge & Iron Company; 500 tons for a Baltimore factory to Dietrich Brothers, and 200 tons for the Carpenter Steel Company, Reading, Pa., to Lewis F. Shoemaker & Co. Including 2500 tons for the Pennsylvania also put under contract, and 300 tons for the Krueger brewery, Newark, and 200 tons for the Driver-Harris Wire Company, the awards in the East exceed 23,000 tons for the week. One new project is an apartment for H. E. Mitler, 500 tons. We now quote mill shipments of plain material at 2.969c. to 3.169c., New York, the price depending as much on the mill selling as on the delivery. From warehouse we quote 3.50c., New York, as minimum.

Steel Plates.—A sale of 650 tons of ship plates at 5½c., Pittsburgh, subsequent quotations of 6c. on this class of material that are regarded as likely to evenuate into definite business, and a stiffening of universal plates to 3.50c. and 3.75c., depending on the mill, tell briefly the story of plate market conditions. So numerous are inquiries, mostly for export, that they are unwelcome. One such was for 30,000 tons for Norway. In cars there has been a lull in the heavy buying of the last few weeks, but early decision is expected in the case of 2000 cars for the Burlington, 2000 cars for the Great Northern and 1000 cars for the M. K. & T. The New York Central is expected to buy 5000 to 7000 more cars, and the Baltimore & Ohio is a prospect. Probably 4000 cars in all were bought since last week's report. Several thousand cars are wanted

for France, and the settlement of the Russian car purchases is shortly expected. We quote universal plates at 3.669c. to 4.169c., New York, with 3.669c. to 3.919c. minimum for earliest shipment, and sheared plates up to 84 in. and in about three months at 4.169c., New York, and the widest plates at 4.419c. to 5.669c. for what may be obtained in the first half of 1917. Plates from warehouse range from 4.25c. to 4.50c., New York, for what is available.

Bars.—The 17,000 tons of angles for France, and for that matter the 27,000 tons of beams, have not been bought at this writing, nor has the last half shell steel, estimated at upward of 750,000 tons, been covered. The early delivery required has resulted in some declinations to consider the business. In general far-forward buying for domestic consumption is still discouraged and in the face of the uptrend in price, some mills evidently plan to hold as much capacity open as possible for expected better prices, thus at the same time minimizing any speculation in material by buyers. One interesting sale was for 16,000 axles for Russian cars, at a price said to be better than 4c. per lb. Export buying of bar iron has lately been of unusually large proportions and slightly better than 2.50c., Pittsburgh. We quote steel bars at 2.869c. to 3.019c., New York, the higher price for the earlier shipments. We quote mill shipments of iron bars at 2.669c., New York. From warehouse steel bars are 3.50c., New York, and iron bars, 3.40c.

Cast-Iron Pipe.—The predicted advance has taken place, and pipe is now \$5 per ton higher than a week ago. Carload lots of 6-in., class B and heavier, are quoted at \$37.50 per net ton, tidewater, with \$1 per ton extra for class A and gas pipe, while corresponding advances have been made in other sizes. The Warren Foundry & Machine Company has been awarded the contract for about 2100 net tons of 6 to 36 in. pipe on which the city of Newark, N. J., opened bids Nov. 2. No public lettings of importance are announced, but plenty of private buyers are in the market for spring delivery.

Old Material.—The market is more active, with prices higher and still advancing. Consumers of heavy melting steel scrap in eastern Pennsylvania are not generally buying, but dealers there are accumulating material in the expectation that buying by consumers in that territory cannot much longer be deferred. Iron rolling mills are free buyers of all kinds of material except wrought pipe, which is comparatively neglected. Much scrap is being taken from this district to western Pennsylvania. Brokers quote buying prices about as follows to local dealers and consumers, per gross ton, New York:

Heavy melting steel scrap (for Eastern Pennsylvania shipment).....	\$16.50 to \$17.00
Old steel rails (short lengths) or equivalent.....	18.50 to 19.00
R-laying rails.....	29.50 to 30.00
Re-rolling rails.....	22.50 to 23.00
Iron and steel car axles (for export).....	41.50 to 42.00
No. 1 railroad wrought.....	22.00 to 22.50
Wrought-iron track scrap.....	19.50 to 20.00
No. 1 yard wrought long.....	17.50 to 18.00
Light iron (nominal).....	3.50 to 4.00
Cast borings (clean).....	9.00 to 9.25
Machine shop turnings.....	7.50 to 8.00
Mixed borings and turnings.....	7.50 to 8.00
Wrought pipe.....	14.50 to 15.00

Cast scrap is considerably higher, partly in sympathy with advancing prices of pig iron and partly due to the improving demand from foundries. Dealers' quotations to consumers of cast scrap are as follows, per gross ton, New York:

No. 1 cast (machinery).....	\$19.00 to \$20.00
No. 2 cast (heavy).....	17.50 to 18.00
Stove plate.....	14.00 to 14.50
Locomotive grate bars.....	14.00 to 14.50
Old carwheels.....	20.00 to 20.50
Malleable cast (railroad).....	16.00 to 16.50

The Fuller Engineering Company, Allentown, Pa., is furnishing a complete pulverized coal plant and furnace equipment for eight 50-ton open-hearth furnaces for the Donora works of the American Steel & Wire Company, Donora, Pa.

British Steel Market

Deliveries to Domestic Consumers Restricted—Exports in General to Be Refused

LONDON, ENGLAND, Nov. 15, 1916—(By Cable).

Makers of steel, corrugated sheets, tin plates and black plates are forbidden to make deliveries to domestic consumers or for export except against government orders. General export permits will in most cases be refused. Pig-iron makers are reticent owing to the congestion of orders. Tin plates are unsettled. American 4-in. billets have sold for \$65 to \$68, c.i.f. Liverpool, for January-March delivery. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 33s.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £20.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.

Steel rails, export, f.o.b. works, £10 17s. 6d.

Hematite pig iron, f.o.b. Tees, 142s. 6d., compared with about 140s. a week ago.

Sheet bars (Welsh) delivered at works in Swansea Valley, £15 5s. nominal.

Steel bars, export, f.o.b. Clyde, £18.

Ferromanganese, (nominal), £33.

Ferrosilicon, 50 per cent, c.i.f., £27.

To Prohibit Steel Imports After the War—Manganese Ore Prices

(By Mail)

LONDON, ENGLAND, Oct. 24, 1916.—It is reported that the iron and steel subcommittee of Lord Balfour's Committee, which was appointed to make recommendations on the basis of the Paris Conference economic proposals, has presented a report urging the entire prohibition of iron and steel imports into the United Kingdom during at least the period of demobilization and reconstruction after the war. No further information, however, is available.

A new official order has been issued by the British authorities prohibiting deliveries of steel and iron to home consumers except against orders certified as Class A work. This order has aroused considerable apprehension among Cleveland iron makers and users, for it is probable that the execution of numerous orders entered under Class B work will be temporarily hung up, which is the more curious considering that Class B directly or indirectly refers to military requirements.

The export trade in pig iron continues restricted, makers only selling as far as circumstances permit. There is a keen demand for prompt warrant iron, and the reserve stocks in public stores, which have been further considerably reduced, may disappear entirely. Furnaces in blast in the East Coast district are now 72, of which 28 are of Cleveland iron, 31 on hematite and 13 on special irons.

American material has shown considerable irregularity though a distinctly easier tendency. Notable concessions have been made, down to about \$63 for 4-in. billets for November shipment, while \$63 to \$65 is asked for January-March shipment. Two-inch material afloat has been offered at £14, all c.i.f. Liverpool. A fair tonnage has been sold to France for immediate shipment including 2-in. billets at £15 10s. and special soft wire rods in coils at £20 5s. c.i.f.

There has been a hitch regarding imports of steel wire rods from America, it having been maintained by certain authorities here that the material constitutes "hardware," and as such came within the restrictions of import regulations. In one or two cases considerable inconvenience has been caused by delays in shipping wire rods, but the matter has been satisfactorily adjusted by the recognition that whatever steel wire rods may be, they are certainly not hardware in any business acceptance of the term.

The tin-plate market has been exceedingly dull and prices have been shaded further even for stock plates. The output of the mills is now only at about 40 per cent of normal and some makers are complaining loudly of the inadequate deliveries of steel.

Ferromanganese shows a steady tone but no special feature.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c. Denver, pipe, 76.1c., minimum carload, 46,000 lb.; structural steel and steel bars, 83.6c.; minimum carload, 36,000 lb. Pacific coast (by rail only), pipe, 65c.; structural steel and steel bars, 75c., minimum carload, 50,000 lb.; structural steel and steel bars, 80c., minimum carload, 40,000 lb. No freight rates are being published via the Panama Canal, as the boats are being used in transatlantic trade.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, $\frac{1}{4}$ in. thick and over, and zees 3 in. and over, 2.75c. to 2.85c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs.	.10
Angles, 3 in. on one or both legs less than $\frac{1}{4}$ in. thick, as per steel bar card, Sept. 1, 1909.	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail).	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909.	.20 to .80
Deck beams and bulb angles.	.30
Handrail tees.	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	.155
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, $\frac{1}{4}$ in. thick, 6 in. up to 100 in. wide, 3.50c. to 4.25c., base, net cash, 30 days, or $\frac{1}{2}$ of 1 per cent discount in 10 days, carload lots. Extras are:

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates.	.15
"A. B. M. A." and ordinary firebox steel plates.	.20
Still bottom steel.	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Gage Extras

Rectangular, $\frac{1}{4}$ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than $\frac{1}{4}$ in., to $\frac{3}{16}$ in., up to 72 in. wide.	.10
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 72 in. to 81	.20
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 84 in. to 96	.30
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 96 in. to 100	.40
*Lighter than $\frac{1}{4}$ in., including $\frac{3}{16}$ in., over 100 in. to 102	.45
Lighter than $\frac{3}{16}$ in., including No. 8, up to 72 in. wide	.15
*Lighter than $\frac{3}{16}$ in., including No. 8, over 72 in. to 84	.25
*Lighter than $\frac{3}{16}$ in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide..	.30
Lighter than No. 8, including No. 10, up to 60 in. wide..	.35
Up to 72 in. and not less than 10.2 lb. per sq. ft. will be considered $\frac{1}{4}$ in.	
Over 72 in. must be ordered $\frac{1}{4}$ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of $\frac{3}{16}$ in., take price of $\frac{3}{16}$ in.	
Over 72 in., ordered weight $\frac{3}{16}$ in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

No charge for rectangular plates to lengths 3 ft. and over.	
Lengths under 3 ft. to 2 ft. inclusive.	.25
Lengths under 2 ft. to 1 ft. inclusive.	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$65 to \$70.

Wire Products.—Prices to jobbers effective Oct. 19:

Fence wire Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.80; galvanized, \$3.50. Galvanized barb wire and sta-

ples, \$3.70; painted, \$3. Wire nails, \$2.85. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.75. Woven wire fencing, 55 per cent off list for carloads, 54 off for 1000-rod lots, 53 off for less than 1000-rod lots.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect from Nov. 15, 1916, all full weight:

Steel		Iron	
1 $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{5}{8}$	61	34 $\frac{1}{2}$	1 $\frac{1}{2}$ and $\frac{3}{4}$
1 $\frac{1}{2}$	65	50 $\frac{1}{2}$	50
$\frac{5}{8}$ to 3	68	54 $\frac{1}{2}$	51
		$\frac{5}{8}$	55
		$\frac{5}{8}$ to 1 $\frac{1}{2}$	57
		$\frac{5}{8}$	58
			42

Lap Weld		Reamed and Drifted	
2	61	48 $\frac{1}{2}$	1 $\frac{1}{4}$
2 $\frac{1}{2}$ to 6	64	51 $\frac{1}{2}$	1 $\frac{1}{2}$
7 to 12	61	47 $\frac{1}{2}$	2
13 and 14	51 $\frac{1}{2}$	51 $\frac{1}{2}$	2 $\frac{1}{2}$ to 4
15	49	4 $\frac{1}{2}$ to 6	3 $\frac{1}{2}$ to 4
		7 to 12	4 $\frac{1}{2}$

Butt Weld, extra strong, plain ends		Lap Weld, extra strong, plain ends	
1 $\frac{1}{2}$, $\frac{3}{4}$ and $\frac{5}{8}$	57	1 $\frac{1}{4}$, $\frac{3}{4}$ and $\frac{5}{8}$	50
1 $\frac{1}{2}$	62	49 $\frac{1}{2}$	55
$\frac{5}{8}$ to 1 $\frac{1}{2}$	66	53 $\frac{1}{2}$	59
2 to 3	67	54 $\frac{1}{2}$	59

Butt Weld, extra strong, plain ends		Lap Weld, extra strong, plain ends	
2	59	47 $\frac{1}{2}$	1 $\frac{1}{4}$
2 $\frac{1}{2}$ to 4	62	50 $\frac{1}{2}$	51
4 $\frac{1}{2}$ to 6	61	49 $\frac{1}{2}$	53
7 to 8	57	43 $\frac{1}{2}$	55
9 to 12	52	38 $\frac{1}{2}$	54
		7 to 8	48
		9 to 12	43

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Nov. 1, 1916, are as follows:

Lap-Welded Steel		Standard Charcoal Iron	
1 $\frac{1}{2}$ in.	31	1 $\frac{1}{2}$ in.	28
1 $\frac{1}{2}$ and 2 in.	43	1 $\frac{1}{4}$ and 2 in.	35
2 $\frac{1}{2}$ in.	40	2 $\frac{1}{4}$ in.	32
2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ in.	46	2 $\frac{1}{2}$ and 2 $\frac{1}{2}$ in.	38
3 and 3 $\frac{1}{2}$ in.	51	3 and 3 $\frac{1}{2}$ in.	43
3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	52	3 $\frac{1}{2}$ to 4 $\frac{1}{2}$ in.	44
5 and 6 in.	45	5 and 6 in.	37
7 to 13 in.	42	7 to 13 in.	34

Locomotive and steamship special charcoal grades bring higher prices.

1 $\frac{1}{2}$ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets	
Nos. 3 to 8	3.50 to 3.60
Nos. 9 to 12	3.15 to 3.25
Nos. 13 and 14	3.25 to 3.35
Nos. 15 and 16	3.30 to 3.40

Box Annealed Sheets, Cold Rolled	
Nos. 17 to 21	3.45 to 3.55
Nos. 22 and 24	3.50 to 3.60
Nos. 25 and 26	3.55 to 3.65
No. 27	3.60 to 3.70
No. 28	3.65 to 3.75
No. 29	3.70 to 3.80
No. 30	3.80 to 3.90

Galvanized Sheets of Black Sheet Gage	
Nos. 10 and 11	4.25 to 4.35
Nos. 12 to 14	4.35 to 4.45
Nos. 15 and 16	4.50 to 4.60
Nos. 17 to 21	4.65 to 4.75
Nos. 22 and 24	4.80 to 4.90
Nos. 25 and 26	4.95 to 5.05
No. 27	5.00 to 5.10
No. 28	5.25 to 5.35
No. 29	5.40 to 5.50
No. 30	5.55 to 5.65

Tin Mill Black Plate	
Nos. 15 and 16	3.20 to 3.30

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Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery

Copper, New York	Tin	Lead		Spelter			
		Electro-	New	New	St.	New	St.
Nov. 1	30.00	30.00	42.75	7.00	6.90	11.00	10.75
8	31.00	31.00	42.87 1/2	7.00	6.90	11.25	11.00
9	32.00	32.00	43.25	7.00	6.90	11.37 1/2	11.12 1/2
10	32.25	32.25	43.25	7.00	6.90	11.37 1/2	11.12 1/2
11	32.25	32.25	43.87 1/2	7.00	6.90	11.40	11.15
12	32.50	32.50	44.12 1/2	7.00	6.90	11.50	11.25
13							
14							

NEW YORK, Nov. 15, 1916

The anxiety of consumers to cover their requirements has created a scarcity of both prompt and future copper and caused prices to advance to the highest level of years. Tin has been active and quotations are higher. Lead is inactive. Spelter has advanced moderately under a fair and steady demand. Antimony remains quiet.

New York

Copper.—The recent tremendous buying for export, with reports of negotiations for additional large quantities, coupled with large domestic purchasing, is responsible for a rush to buy copper which has sent its price to the highest level since 1872. As a result there is a genuine scarcity, not only of prompt metal but of any that can be delivered in the first quarter, and there is none too much available for the second quarter. Consumers who have been in need have seemingly been willing to pay any price, with the result that there has been considerable variance in the prices paid. Conservative predictions are that the price will go at least to 35c. this week. At the present time the buying is not widespread, but those who are in the market appear eager to take any odd lots that may be offered. The stocks of dealers are understood to have been wiped out, but the metal can be obtained if high enough prices are paid, some of it probably being released by consumers who can realize a big profit. On Nov. 11 reports came out that the French Government was negotiating for 225,000,000 lb. for delivery in the last half of next year, and this increased the anxiety of consumers to buy. On Nov. 8, February electrolytic sold at 30c.; Nov. 9, nearby sold at 31c., first quarter at 30c. and second quarter at 29.50c.; Nov. 10, late November sold at 31c.; Nov. 13, second quarter sold at 30c. early in the day and 30.50c. at the close; Nov. 14, second quarter sold at 30.50c., and a sale of spot was reported at 33c., December at 32c., and January and February at 32.75c. The aggregate of buying in all quarters is extremely large. Lake is at the same level as electrolytic. Spot electrolytic was quoted in London yesterday at £152, against £144 a week previous. The exports of the month, including yesterday, are moderate, amounting to only 7202 tons.

Tin.—On Monday an extremely heavy business was done, at least 500 tons having been sold, with unsatisfied inquiry amounting to at least 700 tons. Both dealers and consumers were the buyers, the former for the reason that they were short of metal wherewith to fill contracts. Some of them have met with poor success in getting licenses to ship from England. The market was quiet Nov. 8 and 9, but on the 10th it was fairly active and dealers seeking forward deliveries. Preference was given to tin on steamers which were actually named, these being considered as giving some assurance of arrival. The market was quieter on the 14th than on the preceding day, although even so probably 300 tons was dealt in. The arrivals this month tend to strengthen the situation, as they total but 500 tons. There is afloat 4202 tons. The quotation yesterday was 44.12 1/2c.

Lead.—Throughout the week the market has been quiet, but firm at 7c., New York. At St. Louis the leading interest continues to quote 6.92 1/2c., but independents have taken business at 6.90c. There is nothing to indicate the development of any weakness in the near future. The London quotation for spot lead is £30 10s.,

where it has stood for two weeks. The exports this month, including yesterday, total 1022 tons.

Spelter.—The market is strong and prices are gradually working upward. Business has been steady, with brass mills the most active buyers since the price left 10.50c., up to which time the galvanizers were interested. Export buyers have also taken a considerable quantity. Aside from these influences, the market has been strengthened by an advance of \$10 in the price of zinc ore at Joplin, making its cost \$90 per ton. In consequence, it is costing the producers of spelter about 10 1/2c., St. Louis, to make the metal. Prompt was quoted yesterday at 11.25c., St. Louis, and 11.50c., New York; December at 11.12 1/2c., St. Louis, and first quarter at 11c., St. Louis. The greater part of the recent business has been for first quarter delivery, with some for the second quarter. Prices are expected to hold firmly until some time next March. Cold weather has seriously interfered with the gas supply in the West and hampered production, a condition which is likely to grow worse as winter weather becomes more intense. The exports continue on a large scale, amounting this month, including yesterday, to 6996 tons. The London quotation for spot yesterday was £56, against £53 5s. a week previous. Sheet zinc has been advanced to 17c., f.o.b. mill, for carload lots.

Antimony.—The demand is quiet but the price continues firm at about 13c., duty paid.

Aluminum.—This metal shows a little additional strength. No. 1 virgin metal, 98 to 99 per cent pure, is quoted at 64c. to 66c. For small lots of ingots jobbers are asking 75c.

Old Metals.—The market is higher and demand very good. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	27.50 to 28.50
Copper, heavy and wire	25.50 to 26.50
Copper, light and bottoms	22.50 to 23.50
Brass, heavy	16.00 to 17.00
Brass, light	13.00 to 13.75
Heavy machine composition	22.00 to 23.50
No. 1 yellow rod brass turnings	15.75 to 16.50
No. 1 red brass or composition turnings	17.00 to 18.00
Lead, heavy	6.625
Lead, tea	6.125
Zinc	8.50 to 8.75

Chicago

Nov. 13.—The rapid advance in prices of copper, supported by increases in the prices of tin, spelter and zinc, presented suggestive indications of a runaway market. The non-ferrous metals reflect the generally prevailing conditions applicable to all metals of unceasing inquiry and sales and limitation of supply. Scrap metals are likewise quoted at substantial advances over the prices of a week ago. We quote: Casting copper, 30c. to 30.50c.; Lake copper, 32.50c. to 33c.; tin, carloads, 44.50c., and small lots, 46.50c.; lead, 6.95c.; spelter, 11.25c.; sheet zinc, 17c.; Cookson's antimony, 50c.; other grades, 15c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 25.50c.; copper bottoms, 22.50c.; copper clips, 24.50c.; red brass, 20c.; yellow brass, 16c.; lead pipe, 6c.; zinc, 8c.; pewter, No. 1, 25c.; tinfoil, 30c.; block tin pipe, 35c.

St. Louis

Nov. 13.—Non-ferrous metals were stronger and higher during the week, with lead quoted to-day, carload lots, at 7c.; spelter, carload lots, 10.50c. to 10.75c., according to delivery. In less than carload lots, quotations to-day were: Lead, 7.25c.; spelter, 12.50c.; tin, 48c.; Lake copper, 31c.; electrolytic copper, 30.75c.; antimony, Asiatic, 16c. In the Joplin ore district zinc blende was higher, reaching \$90 per ton basis of 60 per cent metal, at the close of the week, with the range downward, on second grade ores, to \$75. The average for the week for the district was \$83. Calamine ranged from \$45 to \$50, basis of 40 per cent metal, with the average for the week for the district \$47.50. Lead ore was firm, with the bulk of the sales at \$87, with the district average for the week also at that figure. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 9c.; heavy yellow brass, 12c.; heavy red brass and light copper, 17c.; heavy copper and copper wire, 19c.; zinc, 6c.; lead, 5c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 31c.

OBITUARY

Edward Thomas Hendee, secretary of Joseph T. Ryerson & Son, Chicago, died suddenly at Minneapolis, Nov. 12, having been taken seriously ill while on a business trip. Mr. Hendee had attained to a position of foremost responsibility in the Ryerson organization, and was prominently known in the railroad supply and



EDWARD T. HENDEE

machine-tool field. He was 36 years old when he died, having been born in 1880 at Claremont, N. H. He was graduated from New York University in 1900, where he was later assistant professor of mechanical engineering, and took his M.E. and M.S. degrees. He also had the degree of doctor of science from Columbia University. His association with Joseph T. Ryerson & Son began in 1902 as advertising manager. He later built up and became manager of the machinery and railroad supply departments. Mr. Hendee was also vice-president of the Lennox Machine Company, and a director of the American Glyco-Metal Company. While in his business connections he had been known as especially energetic, he found time for other associations to which college and club life had led. He leaves his widow and two sons.

WILLIAM COOPER CUNTZ, of whose death brief mention was made last week, died at Auburndale, Mass., Nov. 2, aged 45 years. He was on a visit for the benefit of his health, which had been impaired by an operation for appendicitis a year ago. Mr. Cuntz was general manager and director of the Goldschmidt Thermit Company, 120 Broadway, New York. He was born in Hoboken, N. J., in 1871. His maternal grandfather, William Cooper, was a well-known naturalist and one of the founders of the New York Academy of Science. Mr. Cuntz was educated at the Hoboken Academy and at Stevens Institute of Technology, graduating from the latter in 1892, with the degree of mechanical engineer. He then became connected with the Pennsylvania Steel Company, Steelton, Pa., first with the bridge and construction department, which he represented as resident engineer in Boston, Mass., and as European resident engineer in London, England. In these capacities he rendered many important services to his company. He then entered the sales department, serving as assistant general manager of sales in Philadelphia and later as district sales manager at Steelton, Pa. At the outbreak of the Spanish-American War in 1898 he volun-

teered for service in the artillery. In 1910 he was appointed by President Taft a delegate to the International Railway Congress at Berne, Switzerland. In the same year he severed his connection with the Pennsylvania Steel Company, to become a director and the general manager of the Goldschmidt Thermit Company. Under his management the business of the company not only increased greatly, but equal progress has been made in the technical development of the thermit process. His wide experience in the steel industry naturally caused him to take a particular interest in the manufacture of carbon-free metals, and it is largely due to his perseverance and initiative that these metals and alloys are coming into such general use. He leaves his widow and two sons. He was a member of some 20 clubs and societies, including the American Iron and Steel Institute and India House.

Neil Robinson, Charleston, W. Va., died at the Jewish Hospital in Cincinnati, Nov. 11, aged 63 years. He had been suffering for some time with heart trouble. He was president of the LaFollette Coal & Iron Company, LaFollette, Tenn., and was widely known in the iron and coal trades. He took an active part in the development of the West Virginia coal fields and, years before the Chesapeake & Ohio Railway was built, made shipments of coal from his mines to Huntington and



NEIL ROBINSON

transshipped from there. He was the designer of the great West Virginia coal column which attracted so much attention at the Jamestown Exposition. He was president of the Citizens National Bank of Charleston and was interested as a director in many manufacturing and mining enterprises. He was prominent in Masonry, having been Grand Master of Masons of West Virginia and the first Potentate of the Mystic Shrine at Charleston.

Mr. Robinson was born at Gallipolis, Ohio, went to Cincinnati when very young, and moved from Cincinnati to Charleston about 30 years ago. He leaves his widow.

ROBERT G. VALENTINE, commissioner of Indian Affairs under President Taft, and more recently known as an industrial counselor in settling labor disputes, died suddenly from heart disease Nov. 14, at the Hotel Manhattan, New York. He was a member of the firm of Valentine, Tead & Gregg, Boston, doing a business as efficiency experts. He was born in West Newton, Mass., and was in his forty-fifth year.

CHARLES H. DAKER, Pittsburgh, died in the Suburban Hospital, Bellevue, Pa., Nov. 8, from pneumonia, aged 38 years. He was connected with the Pittsburgh office of Eaton, Rhodes & Co., having charge of sales of semi-finished and finished steel. He had previously been Pittsburgh representative for Matthew Addy & Co. for several years, and before that was connected

with the Pittsburgh office of Hickman, Williams & Co., his identification with the iron and steel business in the Pittsburgh district covering about 15 years. He leaves his widow, one son and one daughter.

FREDERICK W. GERDES, president Hall Steam Pump Company, Pittsburgh, died suddenly at his home in that city, Nov. 9, aged 75 years. He had been ill for some months, but was thought to have fully recovered, and was attending to business a part of the day on which he died. He was born in Alpena, Germany. He leaves four daughters.

CARL OSCAR LILJEROS, an organizer and officer of the Athenia Steel Company, Athenia, N. J., died Nov. 8 at his home in Clifton, N. J., aged 45 years. He was the inventor of many specialties for machine shop service, the best known of which is probably the "knock-down" elevator for lifting heavy material. He leaves his widow and five children.

WILLIAM J. BURLEE, shipbuilder, died Nov. 7 at his home in Port Richmond, Staten Island, N. Y., aged 55 years. He was born in Parkesville, Pa., but had been a resident of Staten Island for 31 years. He organized the Staten Island Shipbuilding Company, of which he was president at the time of his death, in 1898.

THOMAS BARNETT MILLER, for many years a member of the shipbuilding firm of Alexander Miller & Brothers, in Jersey City, N. J., died Nov. 8 at his home in Brooklyn, aged 52 years. He leaves his widow and two daughters.

NEWTON P. MCKEAN, president Cleveland Co-operative Stove Company, Cleveland, died Oct. 21.

engineer at the Edgar Thomson works, when Mr. Slick was transferred to the general offices of the company in Pittsburgh. He was in charge of the engineering in the Edgar Thomson organization in connection with the large amount of new construction, rebuilding and improvement work made at that plant in recent years. He is a member of the American Iron and Steel Institute.

C. M. Power, for some years general manager of sales of the Standard Chain Company, Pittsburgh, will continue in the same capacity for the welded chain department of the American Chain Company, which recently absorbed the Standard Company. The general sales of the combined production will be under the supervision of Walter M. Taussig, general sales director of the American Company.

Dr. William H. Tolman was removed from the directorship of the American Museum of Safety by the trustees Oct. 30, and since then A. A. Hopkins has been acting director. The cause is not stated. Dr. Tolman has been director of the museum since its foundation, and has done extensive work here and in Europe for the promotion of the use of safety devices in industrial plants. On Nov. 13 he filed suit to recover \$2,596 from the institution, alleging breach of contract.

W. F. Davidson, until recently connected with the Reliance Steel Casting Company, Pittsburgh, has resigned to become works engineer of the Granite City, Ill., works of the American Steel Foundries.

J. R. Morehead, who has been connected with the Pittsburgh office of Rogers, Brown & Co. for about 15 years, has been transferred to the firm's Cleveland office.

Stanley Sheldon, assistant purchasing agent, Stanley Works, New Britain, Conn., has resigned to develop the mill supply department of the Rackliffe Brothers Company in the same city.

August B. Seelig, secretary Chase Rolling Mills Company, Waterbury, Conn., has resigned. It is reported that he is to go into business for himself.

Edwin K. Morse has been appointed transit commissioner of Pittsburgh by the mayor of that city, instead of Morris Knowles, as recently stated.

The Waterbury Iron Works, Waterbury, Conn., has secured the services of Leonard Kipp, consulting engineer, formerly chief mechanical engineer of the Chase Metal Works. This accession to its staff will enable the company to take care of steel work on a larger scale.

The Modern Tool Company, Erie, Pa., manufacturer of grinding machines and threading tools, announces the appointment of R. H. Wood as manager of its district office, 32 North Clinton Street, Chicago. He was for a number of years connected with the Buffalo office of the Warner & Swasey Company.

B. A. Brennan, formerly contract manager of the Westinghouse Machine Company, and later sales manager of the power department of the Bethlehem Steel Company, has resigned the vice-presidency of Mercantile Trust Company, St. Louis, to accept the presidency of the Citizens Company, Inc., Baltimore, to which office he has just been elected. The Citizens Company is an investment banking institution.

Clarence W. Marsh has opened an office at 101 Park Avenue, New York, for engineering investigations, plant design and construction for industrial, chemical and electrochemical enterprises.

Harold R. Wade, manager of the Pittsburgh branch of the Electro Galvanizing Company, has been appointed general manager of the jobbing plants of the United States Electro Galvanizing Company, Brooklyn, N. Y. T. T. Diehl, formerly with Hubbard & Co., has been appointed to succeed Mr. Wade. C. E. Mool, of the credit department, has been promoted to the position of superintendent.

John U. Byrd, a well-known pig-iron and coke salesman in the Central West, has opened offices in the Commercial Tribune Building, Cincinnati. In addition to handling pig iron, coke and coal, he has been appointed

PERSONAL

Sydney Dillon on Nov. 1 was appointed chief mechanical engineer of the Carnegie Steel Company, at Pittsburgh, succeeding John Hulst, whose appointment as assistant to the vice-president and chief engineer of the United States Steel Corporation was noted in these columns a few weeks ago. Mr. Dillon began his career at the Edgar Thomson works of the Carnegie Company at Bessemer, Pa., in 1889 as a messenger boy, going in the engineering department one year later. In 1901 he succeeded E. E. Slick as chief



SYDNEY DILLON

sales agent for the Louisville Fire Brick Works, whose plant is located at Grahn, Carter County, Ky., and of the Ohio Marble Company, maker of fluxing stone.

A dinner in honor of President Charles M. Schwab of the Bethlehem Steel Corporation is to be given on Tuesday, Nov. 21, by Mayor Preston of Baltimore in that city. Announcement of important additions to the Sparrows Point plant will then be made.

Ernest S. Cox, who resigned July 1 as Pittsburgh representative of R. K. Carter & Co., New York City, has engaged in business on his own account as direct representative of manufacturers of mill supplies and hardware specialties, with offices at 326-328 Diamond Street, Pittsburgh.

Pittsburgh and Nearby Districts

The strike of the molders of the Pittsburgh district, which started in November, 1915, is practically over, the molders having been defeated. The sole contention in this strike was an 8-hr. day, which Pittsburgh founders insisted they could not grant. At the outset an effort was made to settle the impending strike by giving the molders an advance in wages, which they refused to accept. All the foundries in the Pittsburgh district are now operating to practically full capacity. While the strike has not been officially declared off, many of the striking molders have returned to work on a 9-hr. day basis.

At the annual meeting of stockholders of the Carbon Steel Company, held in its offices in Pittsburgh, Nov. 13, directors were elected as follows: Charles McKnight, George S. Macrum, Dean R. Wilson, Charles E. Middleton, Raymond S. Baldwin, C. D. Blue, Jr., and Holland S. Duell. The directors organized by electing Charles McKnight, president; Dean R. Wilson, vice-president and treasurer; C. F. Blue, Jr., vice-president and general sales agent, and W. W. Noble, secretary. The executive committee consists of Charles McKnight, Dean R. Wilson and Charles E. Middleton.

The Youngsville Radiator Company, Youngsville, Pa., builder of automobile radiators, will increase its capital stock from \$25,000 to \$50,000. The company now occupies 8600 sq. ft. of floor space, but will likely erect additional buildings early next spring.

The American Sheet & Tin Plate Company has decided to add 10 more hot tin mills at its Farrell works at Farrell, Pa., and 10 more at its Shenango works at New Castle, Pa. The Farrell works will then have 30 hot mills and the Shenango 40. Work will be pushed as fast as possible, and it is hoped to have the new mills ready for operation early next summer. Most of the contracts have already been placed, but some of the machinery will be built by the company itself. At present the American Sheet & Tin Plate Company has a total of 196 hot tin mills, and has nearly completed the building of 24 mills at its new Gary, Ind., plant. These, with the 20 to be built at Farrell and New Castle, will give the company a total of 240. It will then have about the same number of hot mills as all the independents.

Due to recent advances in mill prices on plates, shapes and bars, warehouses at Pittsburgh are now quoting these materials for prompt shipment as follows: Structural shapes, 3.50c.; plates, 4c. to 4.50c.; bars, small shapes, flats, rounds and squares, under 2 in., 3.40c.; over 2 in., 4.05c. The demand for these products from warehouses is heavy, many of the smaller fabricators thus getting the greater part of their supplies, paying premiums in preference to taking long deliveries from the mills. Sales managers of warehouses state they are having great trouble in keeping stocks up to the standard, owing to the congested condition of the order books of the mills.

Twenty-seven new type forced draft high reserve capacity stokers of the underfeed type have been sold by the Westinghouse Electric Export Company, East Pittsburgh, Pa., for service in Japan. The stokers are for use with 600-hp. boilers. Twenty of them were sold to the Osaka Electric Light Company, two to the

Nogola Electric Light Company and five to the Imperial Steel Company. The orders also included engines for operating the stokers, turbine and motor-driven forced draft fan units, controllers and other auxiliaries.

The machinists' strike in Youngstown seems to have passed over rather uneventfully. The new men employed to fill the places made vacant when the strikers were let out are taking up their residences in the city permanently. The machinists made demands that were deemed unreasonable by the employers, the principal ones being closed shop and an 8-hr. day.

The Braddock Mfg. Company, steel founder and machinist, Braddock, Pa., has let a contract for an addition to its open-hearth building to the McClintic-Marshall Company, Pittsburgh, calling for about 125 tons of steel. It will install a second 20-ton furnace and other new minor equipment and expects to have the new furnace ready for operation in January.

The Brier Hill Steel Company, Youngstown, will likely start a new open-hearth furnace in December and another in January. These will then make a total of 12 90-ton furnaces. The company intends to build a new jobbing mill, but work on it will not start while the present abnormal demand for billets and sheet bars continues.

The Youngstown Sheet & Tube Company, Youngstown, which will build three more 100-ton open-hearth furnaces, is in the market for 14 electric traveling cranes, including one 175-ton and two 100-ton ladle cranes, also charging and stripping machines and standard lifting equipment.

The Pittsburgh & Lake Erie Railroad has bought two large shears and several punches for its shops at Struthers, Ohio.

The report that Mary furnace of the Ohio Iron & Steel Company at Lowellville, Ohio, has been blown out for relining is incorrect. It is not expected that this stack will have to be blown out for some time. In October it made over 11,000 tons of basic iron.

At Youngstown, on Nov. 10, the prices obtained for shipments of bar iron in September and October by mills that sign the Amalgamated scale were found to have been on the basis of 2c. per lb. This entitles puddlers to a rate of \$9.55 per gross ton for puddling for the months of November and December, the highest ever paid for puddling in the history of the trade, against \$9.30 paid in September and October.

The plant of the Canonsburg Steel & Iron Works, Canonsburg, Pa., maker of iron and steel sheets, which has been closed for several months owing to labor troubles, is now in practically full operation, the company having reached an agreement with its men.

In October the Valley Mold & Iron Company, Sharpsville, Pa., made and shipped 28,855 tons of ingot molds and stools, the largest month's output in the history of this company.

The Concrete Steel Company, Youngstown, has received a contract for the complete Havemeyer steel fabrication for the new buildings of the Fisher Body Company, Detroit, Mich. This is one of the largest concrete steel construction contracts placed for a long time. The Concrete Steel Company has made large additions to its plant at Youngstown recently, consisting of a machine shop, storage house and extension of the fabricating plant.

Reports are in circulation that several Detroit automobile builders are contemplating building a plant at Kittanning, Pa., about 45 miles from Pittsburgh, for the manufacture of steel sheets. It is said a tract of 30 acres has been secured on which the new plant will be built, but the report cannot be confirmed.

The Bakewell Motor Car Co., Pittsburgh, with a capital stock of \$50,000, has been incorporated by Frank S. Delf, Pittsburgh; George L. Walter, Jr., Sharpsburg, and Grayson M. Metz, Aspinwall, Pa., to buy, sell, repair and deal in automobiles, motor trucks and machinery of all descriptions.

Furnace No. 4 of the Shenango Furnace Company, Sharpsville, Pa., was blown in on Sunday, Nov. 12. It had been completely relined, the bosh and hearth en-

larged, and other improvements made in just six weeks, which is a remarkable record when present conditions in the supply of labor and deliveries of material are considered. It was blown in on Bessemer iron, and is expected to make about 325 tons per day.

At Youngstown, Ohio, the bi-monthly examination of sales sheets of tin plate and sheets showed that sheet and tin mill hands are entitled to an advance of 1 per cent in November and December over wages paid in September and October. The sheet settlement is made by using as a basis the sales of sheets by the Brier Hill Steel Company, Newport Rolling Mill Company and Trumbull Steel Company. The tin-plate settlement is based on prices of the National Enameling & Stamping Company, Carnahan Tin Plate & Sheet Company and Trumbull Steel Company. Sheet and tin mill workers are now receiving the highest wages that have ruled for some years.

The new 500-ton blast furnace of the Republic Iron & Steel Company, Youngstown, will be completed about next April, and the new pipe mill to roll lap-weld pipe up to 16 in. is expected to be ready in January. The company is installing Hughes gas producers at two of its bar mills to replace natural gas as fuel.

The George J. Hagan Company, 401 People's Bank Building, Pittsburgh, builder of heating and annealing furnaces and stokers, has opened a branch office in 406 Garfield Building, Cleveland.

Moorhead, Brother & Co., Sharpsburg Station, Pittsburgh, have arranged to put their 16-in. mill in operation, beginning Dec. 1, for a long run.

Joint Meeting of Employers' Associations

The officers and executive boards of the employers' associations of Worcester, Hampden and Berkshire counties of Massachusetts and New Haven, Hartford and Litchfield counties of Connecticut, together with representatives from similar associations in Rhode Island, Newark, N. J., Cincinnati, Ohio, and other places, gathered at the Allyn House, Hartford, Conn., Nov. 10, in afternoon and evening sessions. The afternoon session took the form of a conference on the conditions in each section represented and many interesting reports were given on the open shop campaigns in the various districts. The evening session was attended by about 500 members of the different organizations and interesting speeches were made by speakers representing different sections of the country.

The chief speaker at the evening session was Judge Spear, of Newark, N. J. Other speakers were men of prominence in machine-tool building and other industrial lines, and there was keen interest in all that was said. The various addresses emphasized the keynote of the whole movement that is resulting in the rapid organization of employers' associations, which is best expressed in the words of one interested head of a large industry: "These men are all speaking of what can be done for the workingman, not what can be done to him. How different from the olden times."

The John Obenberger Forge Company, drop and hammered forgings, has discontinued its office at 608 Majestic Building, Milwaukee, and in the future the general offices will be located at the plant on Fifty-third Avenue, at Burnham Street, West Allis, Wis. On Oct. 27 the company made the first shipment of drop forgings from its new plant, and it is now operating day and night.

The Cutler-Hammer Mfg. Company, Milwaukee, maker of electric controlling devices, lifting magnets, etc., is preparing to build a new administration building to cost nearly \$150,000. It will be 50 x 283 ft., six stories and basement, of fireproof construction.

Better living accommodations for workmen are to be provided by the Bethlehem Steel Company, which has arranged to erect 90 cottages on a tract recently purchased at Steelton, Pa.

Luxemburg's Steel and Pig-Iron Output in 1915

The statistics of iron and steel output for 1915 were recently issued by the Chamber of Commerce of the Grand Duchy of Luxemburg. Owing to reduced imports of iron and ore and heavy demand for pig iron, the Rhineland and Westphalian districts in Germany were compelled to turn to the oolitic ores of Luxemburg and Lorraine. Prices rose in consequence from the usual average of 2.5 to 3 francs per ton to 3.16 francs in 1914 and 3.17 francs in 1915, reaching a maximum of 5 francs. The German demand has slackened since July, this year, owing to the competition of ores imported from occupied French territory. The Luxemburg ore and pig-iron output is given as follows in metric tons:

	Iron Ore Output	Price per Ton Francs	Pig-Iron Production	Ore Consumed by Blast Furnaces
1913	7,333,372	2.99	2,547,861	8,656,670
1914	5,007,457	3.16	1,827,270	6,137,609
1915	6,130,434	3.17	1,590,773	5,670,758

Blast furnaces numbered 47 in 1915, of which 40 worked a total of 1639 weeks. Of the ore consumed, 58,389 tons was foreign, and the coke used was 1,908,684 tons.

The steel plants produced 967,821 tons of ingots besides 12,563 tons of castings and electrically refined steel. Nine foundries produced 16,649 tons of iron and steel castings. The rolling mills turned out 246,533 tons of semi-finished steel and 543,371 tons of finished products. The pig-iron output in 1915 consisted of 1,418,247 tons of basic Bessemer iron, 171,106 tons of foundry iron, 246 tons of puddled iron and 1174 tons of miscellaneous iron, at an average price per ton of 71.59 francs.

The Semet-Solvay's Coal Land Purchase

Birmingham advices state that the impression in industrial circles in Alabama is that the Semet-Solvay Company, which recently purchased 7300 acres of coal land of the Alabama Company, adjoining the properties of the Yolande Coal & Coke Company, proposes more than a by-product plant, a steel mill being among the reported probabilities. It is believed very probable that when the Semet-Solvay Company's contract with the Tennessee Coal, Iron & Railroad Company expires, the latter will probably not renew, having an immense by-product plant of its own. In that case the Semet-Solvay Company would be without its largest customer for its Ensley plant. Denial is made of the report that the Semet-Solvay Company intends to consolidate with the Alabama Company, although it is understood that such a thing was at one time contemplated.

The Honolulu Chamber of Commerce on Nov. 7 declared for the open shop at a largely attended meeting. A resolution was adopted by a ten to one vote declaring that it would be the fixed and permanent policy of the chamber to support the free right of every employee and every individual to enter into contracts of employment without interference or dictation from outside parties or organizations, and to insist that Honolulu be maintained as an open shop. Employers and trade unions have been waging a contest over this question for seven months.

The Kalamazoo Malleable Iron Company, Kalamazoo, Mich., expects to have its foundry in operation in February. It will be a two-furnace plant. The dimensions are 235 x 285 ft., with a coal pulverizing plant in connection. The officers are as follows: President, George E. Bardeen; vice-president, W. S. Dewing; treasurer, C. A. Dewing; secretary, A. H. Dane; general manager, D. R. Curtenius; superintendent, W. T. Howell.

H. S. Matthews, Birmingham, Ala., former president of the Alabama Company (when it was the Alabama Consolidated), is president of the Matthews Iron & Mfg. Company, which has taken over the old Silver Run furnace, Rome, Ga., with ore lands attached. The company will begin on basic iron, for which it already has orders. Repairs are to be made at once.

Iron and Industrial Stocks

NEW YORK, Nov. 15, 1916.

In the period beginning with Wednesday of last week the stock market has fluctuated widely. On Wednesday morning United States Steel common reached a new high record, selling up to 126, while a number of other industrial stocks made great gains. The conflicting reports on the result of the Presidential election caused recessions, with alternations of advancing prices. The general trend of the period has, however, been downward except in the case of a few stocks. Republic common has been notably strong, selling up to 84% on Monday of this week. Some attention is being paid in speculative circles to the possibility of early negotiations for peace, which would have an effect on the business of quite a number of important manufacturing establishments. Attention is also given to disquieting news from Mexico and the possibility of a fresh exchange of notes with Germany over its submarine activity. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com..	28 1/2 - 34	Int. Harv. of N. J., com.	117 - 118
Allis-Chal., pref..	85 1/2 - 92	Int. Harv. of N. J., pref.	121 1/2
Am. Can., com..	62 1/2 - 65	Int. Harv. Corp., com.	78 1/2 - 80
Am. Can., pref..	113 1/2 - 115	Int. Harv. Corp., pref.	111 - 112
Am. Car. & Fdy., com.	68 - 72 1/2	La Belle Iron, com.	79 1/2 - 81 1/2
Am. Car. & Fdy., pref.	117	Lacka. Steel...	90 - 98
Am. Loco., com..	91 1/2 - 98 1/2	Lake Sup. Corp.	23% - 27%
Am. Loco., pref..	107 1/2 - 109	Midvale Steel...	68 - 71
Am. Rad., pref..	134	Nat. En. & Stm., com.	32 - 35 1/2
Am. Ship, com..	66 - 70 1/2	Nat. En. & Stm., pref.	99
Am. Ship, pref..	94	N. Y. Air Brake, 158 - 175	
Am. Steel Fdries.	64 1/2 - 66	Pitts. Stl., pref. 104 1/2 - 104 3/4	
Bald. Loco., com..	82 1/2 - 90 1/2	Pressed Stl., com. 74 - 80 3/4	
Bald. Loco., pref..	106 1/2 - 107	Pressed Stl., pref. 105 1/2 - 106 1/2	
Beth. Steel, com..	640 - 684	Ry. Stl. Spring, com.	53 1/4 - 56 3/4
Beth. Steel, pref..	149 - 152	Ry. Stl. Spring, pref.	101 1/4 - 101 1/2
Carb. Steel, com..	112 - 115	Republic, com..	78 - 84 3/4
Case (J.I.), pref..	87 - 88	Republic, pref..	115 - 115 1/2
Central Fdy., com.	17 - 18	Sloss, com..	75 - 82 1/2
Central Fdy., pref.	31 - 33	Sloss, pref..	101 - 101 1/2
Chic. Pneu. Tool	72 - 73 1/2	Un. Alloy Steel..	48 1/2 - 49 1/2
Colo. Fuel	52 1/2 - 56 1/2	U. S. Pipe, com..	25 - 26 3/4
Cruc. Stl. com..	86 1/2 - 95 1/2	U. S. Pipe, pref..	65 - 67
Cruc. Stl. pref..	123 - 124 1/2	U. S. Steel, com..	120 1/2 - 126
Deere & Co., pref.	96 1/2 - 96 3/4	U. S. Steel, pref..	121 1/2 - 122
Driggs-Seabury	87 - 96 1/2	Va. I. C. & Coke	52 - 59 1/2
Gen. Electric	179 - 184	Warwick	10
Gt. No. Ore Cert.	42 1/2 - 46 1/2	Westing. Elec..	63 1/2 - 67 1/2
Harb-Walks. Refrac., com.	127		
Harb-Walks. Refrac., pref.	106		

Dividends

The Pratt & Whitney Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable Nov. 15.

The Niles-Bement-Pond Company, regular quarterly, 2 1/2 per cent on the common stock, payable Dec. 20, and 1 1/2 per cent on the preferred, payable Nov. 15.

The Harbison-Walker Refractories Company, regular quarterly, 1 1/2 per cent, and extra, 2 per cent, on the common stock, payable Dec. 1.

The Studebaker Corporation, regular quarterly, 1 1/4 per cent on the preferred stock and 2 1/2 per cent on the common, payable Dec. 1.

Deere & Co., regular quarterly, 1 1/4 per cent on the preferred stock, payable Dec. 1.

The International Nickel Company, regular quarterly, \$1.50 on the common stock, payable Dec. 1.

The Moline Plow Company, regular quarterly, 1 1/4 per cent on the first preferred stock, payable Dec. 1.

The Dominion Steel Foundry Company, Hamilton, Canada, regular quarterly, 1 1/4 per cent on the preferred and 2 per cent on the common stock, together with a bonus of 8 per cent on the common, payable Dec. 1. This makes 32 per cent on the common for the year.

Corrosion of Condenser Tubes

Causes of the corrosion of marine condenser tubes are to be investigated by the corrosion committee of the Institute of Metals (British) at the committee's condenser plant now about to be installed by the Brighton Corporation in the Brighton Electricity Works. Two salaried investigators have been appointed, Dr. G. D. Bengough and Dr. O. F. Hudson, and the Government Research Council has granted £1000 a year toward carrying on the research. The plant will be operated under ordinary industrial conditions, the microscopical and other examinations of the metal being carried out in the metallurgical laboratories of the Imperial College of Science and Technology, South Kensington.

New England Power Company's Savings Plan

An opportunity to subscribe for shares of the preferred stock of the New England Power Company, Worcester, Mass., is afforded by a recently announced savings plan which it is offering to its own officers and employees and those of its subsidiary or affiliated companies who have been employed at least one year. The stock is to be paid for at the rate of \$2 per month per share, with the proviso that the amount paid each month shall not exceed 20 per cent of the subscriber's monthly salary. Additional payments can be made from time to time to reduce the unpaid balance, and until the stock is fully paid for interest on the partial payments at the rate of 6 per cent will be credited quarterly to the subscriber, the dividends which the stock would be entitled to being reserved by the company. In addition extra payments commencing Dec. 15, 1917, will be made to the employees subscribing for stock. These payments will begin with 1 per cent on the face value of the stock subscribed for and increase by 1/2 per cent each year up to 1923, when 4 per cent will be paid and for each year thereafter. This provision is irrespective of whether the stock is fully paid up or not. In the event of permanent disability or death the employee or his heirs will receive the amount which had been paid in for the stock, plus its accrued interest, and in addition the par value of the shares subscribed for. In case the shares have been fully paid for the stock will, of course, be retained by the employee or his heirs and a cash payment equivalent to the par value of the stock will be made.

Substitutes for Tin in Germany

The tin scarcity in Germany has been the cause of numerous attempts to find a substitute for tin oxide in white enamels for sheet and cast utensils. Sodium antimonate, largely used in some countries, is not permitted in Germany for cooking utensils. A non-poisonous zirconium preparation called "Terrar" has been introduced by the Chemisch-Metallurgische Industriegesellschaft, applicable to enamels on both sheet and cast metal utensils. Cerium compounds, which replace cobalt in the priming enamel, have been introduced and enable a white ground to be obtained. A cheap white for enamels consisting of zinc sulphide has also been proposed, the proportion being 5 per cent of the material, mainly suitable for very fusible enamels. Other suggested substitutes for tin oxide are mixtures of magnesium and aluminum oxides or of zinc and aluminum oxides, heated to a sufficiently high temperature to form spinels, the covering power being improved by the addition of up to 10 per cent of tin oxide, zirconium oxide, titanic acid or other refractory white pigmentary materials.

French Imports and Exports of Steel and Ore

French imports and exports of iron and steel for the first half of 1916, according to statistics of the Board of Trade, were as follows, compared with the same period in 1915 in metric tons:

	Imports		Exports	
	To July 1, 1915	To July 1, 1916	To July 1, 1915	To July 1, 1916
Pig iron and semi-finished steel	419,276	1,258,908
Iron and steel cast or				
wrought			66,190	91,506
Manganese ore	6,407	33,216		
Iron ore	101,178	277,466	49,508	37,247

The large imports this year of semi-finished steel include steel bars from England and billets from the United States. The increase in imports of manganese ore and iron ore are interesting.

Free night schools have been opened for foreign workmen of the Bethlehem Steel Company at South Bethlehem, Pa. Lehigh University students will be instructors. There are more than 2000 Greeks and as many more of other nationalities at South Bethlehem. About 500 Greeks have already registered. The purpose of the school is to teach the English language.

Machinery Markets and News of the Works

CONDITIONS ARE HEALTHY

Election Had Little or No Influence

Big Lot of Resale Tools Absorbed by One Purchaser—Car and Automobile Builders Buying on Long Deliveries

The presidential election does not appear to have caused even a ripple in the flow of business. Reports from every section indicate a healthy condition of trade, despite a little slower activity in one or two cities and apprehension over the car shortage and new railroad embargoes.

Second-hand machines are exerting no injurious effect as some members of the trade had feared. The large lot of tools valued at \$1,500,000 which was offered in New York a few days ago has been absorbed in its entirety by a large firm with foreign connections. Shell contracts are being concluded in the Central West, and new ones are not coming out, with consequent conjecture as to what will be done with the used equipment.

Cincinnati has been active with large lathes leading the demand. In that city both railroad car and automobile makers have been quietly buying for replacements, despite long deliveries. Business in Detroit is greater in the aggregate because of the influx of small orders. A conservative trend is observable on the part of sellers in that city.

Automobile builders are buying in Cleveland, also contracting for deliveries late next year to care for their 1918 output. The Norfolk & Western Railroad is inquiring for about 35 machines.

The Pullman Company, Chicago, is contemplating extensive purchases for the enlargement of its car shops.

New England points are again embargoed by the New York, New Haven & Hartford Railroad, the restriction being on shipments from the West, via Maybrook, Harlem River and Brooklyn terminals.

In the East the Government orders for ordnance and munitions continue to bring successful contractors into the market for machines of various types. Some large inquiries for turret lathes are out.

New York

NEW YORK, NOV. 15, 1916.

It can be definitely reported that the large number of machine tools, the value of which was estimated at \$1,500,000, which were offered for sale about two weeks ago, have been absorbed, the entire lot having been taken by a large firm with foreign connections, making it probable that they will be exported.

While some large dealers assert that the market is a little slower, though still active, others find no lessening in the number of inquiries and sales of miscellaneous machines. Domestic shell contracts are making business, particularly for turret lathes, both large and small.

Boring mills are in good demand, and the price of some makes shows a tendency to advance. A foreign inquiry calls for 14 mills.

The Worthington Pump & Machinery Corporation, which has a Government contract for shell parts, has inquired

for nine No. 4 hand screw machines, for delivery at Hazleton, Pa.

The Bethlehem Steel Company is closing contracts for about \$160,000 worth of machine tools for its Maryland Steel Company shipbuilding plant at Sparrows Point, Md.

The Standard Shipbuilding Company, Shooters Island, New York, has continued to buy against its recent list. Orders also have been placed by the New York Central Railroad and the Wheeler Condenser & Engineering Company, Carteret, N. J.

The New York & Hagerstown Metal Stamping Company, Hagerstown, Md., has made inquiry for nearly 100 hand screw machines, presumably for munitions work. Its inquiry calls for 40 machines with 1-in. spindle capacity, 39 for $\frac{1}{2}$ -in. stock and 16 for $\frac{1}{2}$ -in. stock. An export inquiry is for 500 small turret lathes.

The Warner & Swasey Company, Cleveland, Ohio, was the successful bidder on 112 No. 4 universal turret screw machines for the Newport Torpedo Station, bids on which were opened Nov. 3.

Makers of forging machinery continue under a great strain because of backward deliveries. One or two railroads have again revived inquiries for this class of machine, only to find prices higher than when they inquired previously.

The Celluloid Company, 290 Ferry Street, Newark, N. J., is having plans drawn by the Stone & Webster Engineering Corporation, 147 Milk Street, Boston, Mass., for 12 two-story factory buildings for its plant at Newark, estimated to cost about \$1,000,000.

The American Synthetic Dyes, Inc., Avenue R, Newark, N. J., has had plans completed for a one-story pumping station, 24 x 39 ft., to cost about \$4,000 and an auxiliary boiler house, one-story, 21 x 30 ft., to cost about \$500.

H. C. Fischer, 500 Huron Street, Brooklyn, N. Y., has awarded contract for the construction of a one-story brick foundry, 50 x 100 ft.

The American Locomotive Company, Schenectady, N. Y., has awarded contract to D. Bennett & Son, Schenectady, for the construction of a one-story addition to its foundry, 100 x 175 ft., estimated to cost \$42,000.

The Air Reduction Company, 50 Broad Street, Newark, N. J., has awarded contract to the H. D. Best Company, 52 Vanderbilt Avenue, New York, for a one-story factory building, 30 x 100 ft., and a four-story building, 45 x 100 ft., to cost about \$75,000.

The Driver-Harris Wire Company, Union Building, Newark, N. J., has let contract for the construction of a three-story addition to its rolling mill, 75 x 80 ft., to cost about \$20,000.

The New Brunswick Iron Works, New Brunswick, N. J., has awarded contract to the Hughes-Foulkrod Company, Philadelphia, for the erection of a one-story foundry, 80 x 120 ft., to cost about \$14,000.

The Manhattan Rubber Mfg. Company, Passaic, N. J., is preparing to erect a four-story addition to its plant, 100 x 297 ft., to be used in the manufacture of rubber products.

The Highlander Machine Company has removed from Rochester, N. Y., to Spencerport, N. Y., where it is equipping a factory for the manufacture of household laundry equipment, such as motor-driven washing machines, electric ironers, heaters, etc. The company recently increased its capital stock from \$20,000 to \$50,000. Within 30 days it plans to finish the installation of its equipment and start running. F. J. Couch is general manager.

The Oxweld Acetylene Company, 646 Frelinghuysen Avenue, Newark, N. J., manufacturer of acetylene apparatus, will build two one-story additions to its foundry, about 42 x 64 ft., and 50 x 55 ft., at a cost of \$15,000.

The National Silencer Company, 495 High Street, Newark, N. J., has been incorporated with a capital of \$50,000 to manufacture combustion engines. Samuel D. Polson, Edmund Schmitt and Louis Miller are the incorporators.

The Automatic Vending Machine Company, 9 Clinton Street, Newark, N. J., has been incorporated with a capital of \$35,000 by H. Hartman, Nathaniel and Samuel Kessler.

The Metal Products & Machine Company, 763 Broad Street, Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture iron and steel specialties.

Leonard L. and Robert S. Terhune and Carey S. Thomas are the incorporators.

The Alphaduct Company, Jersey City, N. J., manufacturer of conduit tubing, will build a four-story plant at 134-42 Cator Avenue.

Goodwill Brothers, Falconer, N. Y., have let contract for a boiler house, 50 x 100 ft., one story.

The Eclipse Machine Company is ready for bids on a machine shop, one story, 40 x 100 ft. Edward J. Dunn is president.

The Buffalo Foundry & Machine Company, H. D. Miles, president, will build a three-story pattern shop, 50 ft. square, at its plant at East Ferry Street and the New York Central Railroad Belt Line.

The department of public works, Rochester, N. Y., R. H. Pierce, commissioner, is having plans prepared for a powerhouse, 40 x 80 ft., one story, to be erected at Irodequoit, a suburb.

The Schoellkopf Aniline & Chemical Company, Buffalo, will build a steel and tile pump house at its new dye works on Abbott Road and the Buffalo Creek Terminal Railroad.

Work has been commenced on the new plant of the United States Alloys, Inc., on the River Road and New York Central Railroad, North Buffalo. The cost, with equipment, will approximate \$300,000.

The Buffalo Copper & Brass Rolling Mill Company, Buffalo, is building a die shop at its plant at Military Road and New York Central Railroad.

Langer & Rosenberg, Port Chester, N. Y., will add a welding shop to their plant, 30 x 70 ft.

The Dutchess Mfg. Company, Poughkeepsie, N. Y., will build a three-story and basement addition, 41 x 95 ft., to its plant on Mill Street to cost \$25,000.

The General Carbonic Gas Company, 887 Seneca Street, Buffalo, will build an addition to its plant at Seneca and Smith streets and the Erie Railroad.

A boiler house, 30 x 75 ft., one story, is to be built and equipped for the House of the Good Shepherd, Genesee Street, Utica, N. Y.

The Erie City Iron Works, Erie, Pa., has completed plans for a plant addition, 38 x 220 ft., one story, for a cleaning room and storage bins.

Philadelphia

PHILADELPHIA, PA., Nov. 13, 1916.

The T. K. Bell Engineers, Inc., Harrison Building, Philadelphia, has been established by Thomas K. Bell and others and has leased the former Rittenhouse foundry and machine shop on Main Street, Norristown, Pa. It will be devoted to the production of iron and steel specialties now being manufactured in Philadelphia.

On Oct. 14 a fire at the 126-in. plate mill of the Central Iron & Steel Company at Harrisburg, Pa., known as mill No. 1, completely destroyed the electric controller equipment for the mill tables and run-out table, and the electric light distributing station and roll shop, serving that mill. Considerable damage was done to the building and the adjoining waste heat boiler house, steam mains, mill operating platforms, etc. The fire, which was of undetermined origin, started just after closing time Saturday. In spite of extensive damage the mill started operation Monday morning on regular time.

The Sanitary Refrigerator & Heater Company has been organized and has purchased 6 acres in Portage, Pa., on the line of the Pennsylvania Railroad. It has had plans drawn and started the construction of a plant for the manufacture of a take-down type of refrigerators, ice-water shelving, etc. Six buildings, including a boiler house, a foundry, etc., are planned. The first structure will be 75 x 300 ft., of brick and tile, one story. W. R. Myton, Johnstown, Pa., is the architect. The company has been incorporated with a capital stock of \$3,000,000. Robert Pearce, Portage, is president; Wallace Sherbine, president First National Bank, Portage, is first vice-president; J. Howard Crosby, Haverstraw, N. Y., is second-vice-president; C. W. Partridge, New York, is treasurer, and William T. Yeckley, Portage, assistant treasurer. H. Douglas Layman of New York; Alvin Sherbine, Johnstown, Pa., and M. E. Baird of New York, are also directors. H. W. Layman is manager.

The Jenkins Interlock Mfg. Company, Philadelphia, Pa., has been incorporated with \$25,000 capital stock to manufacture interlocking devices and other metal specialties. The incorporators are Thomas W. Jenkins, 905 Forty-eighth Street; Frank C. Holberg and Jennie A. Jenkins.

The Leeds & Northrup Company, Philadelphia, manufacturer of electrical instruments, has filed plans for a five-story reinforced concrete building, 55 x 110 ft., at 4901 Stenton Avenue, estimated to cost \$120,000.

The Atlantic Steel Castings Company, Chester, Pa., has given a contract to Camp & Zahniser, Inc., contractors, for alterations and additions to its plant at Sixth and Lloyd streets, Chester.

The Beacon Light Company, Chester, Pa., operated by the Philadelphia Electric Company, has awarded a contract for a new six-story electric power plant, 300 x 420 ft., to cost about \$2,500,000. The Chester Construction & Contracting Company, Heed Building, Philadelphia, is the contractor.

W. O. Young, Philadelphia, is interested in a company which is planning for the establishment of a plant at Pottsville, Pa., for the manufacture of celluloid specialties.

The Albro-Clem Elevator Company, Philadelphia, has acquired property on East Erie Avenue as a site for a large manufacturing plant.

The John A. Roebling's Sons Company, Trenton, N. J., manufacturer of wire and wire rope, is building a four-story brick addition to its plant on Hanover Street. A one-story structure is also being built on Elmer Street. The work is estimated to cost \$55,000.

The John E. Throop Sons Company, Trenton, N. J., manufacturer of machinery, is building a machine shop on Lewis Street to cost about \$25,000.

The Ajax-Grieb Rubber Company, Trenton, N. J., manufacturer of automobile tires, is building a four-story brick and steel addition to its plant, at a cost of about \$300,000.

The Victor Talking Machine Company, Camden, N. J., has had plans prepared for a one-story reinforced concrete addition to its plant, about 80 x 670 ft.

The Wilmot Engineering Company, Hazleton, Pa., is building a plant at White Haven, Pa., for the manufacture of a patented chain.

The American Car & Foundry Company, 165 Broadway, New York, has awarded contract for the construction of a tower riveting building, one story, 22 x 82 ft., estimated to cost \$7,000 and for an addition to the test shop, one story, 24 x 264 ft., estimated to cost \$4,500 at its plant at Midland, Pa. B. B. Cannon is local manager.

New England

BOSTON, MASS., Nov. 13, 1916.

Another embargo was placed in effect Nov. 10 by the New Haven Lines which affects all carload and less than carload lots from the West via Maybrook, Harlem River and Brooklyn terminals. This embargo has the usual exceptions. New York Central and Boston & Albany shipments via piers 31 to 37 on the East River are also barred.

The Merrow Machine Company, Salem, Mass., will build an addition to its machine shop, 20 x 100 ft., one story.

The Bernhard Boiler Company, Boston, Mass., has been incorporated with a capital stock of \$25,000 by Frederick N. LeBaron, West Newton, president and treasurer, L. S. LeBaron and G. L. LeBaron.

The Eastern Motors, Inc., Hartford, Conn., has been incorporated with a capital stock of \$1,000,000 to manufacture motor cars. The incorporators are Willis D. Upson, Fred A. Law and John R. Turk.

The General Electric Company, Pittsfield, Mass., is to build three additions to plant No. 7, 75 x 175 ft., one story.

The William Klein Company, Enfield, Conn., has been incorporated with a capital stock of \$25,000 to manufacture casket hardware. The incorporators are William, Edward S. and Lawrence Klein of Thompsonville.

The Kilborn & Bishop Company, New Haven, Conn., has awarded a contract for an addition to its plant on River Street.

The Silvertown Cycle Mfg. Company, Worcester, Mass., has been incorporated with a capital stock of \$500,000 to manufacture bicycles. The directors are Charles A. Persons, president; Albert D. O'Donnell, clerk; and Orville A. Jones. Plans for a factory have not yet matured, but it is the intention of the company to begin manufacturing soon so that its product may be on the market next summer.

The G. S. Youngs Company, North Avenue, Bridgeport, Conn., has awarded a contract for an addition to its foundry, 72 x 96 ft., one story.

The Electric Cable Company, Bridgeport, Conn., has awarded a contract for a new building, 45 x 130 ft., four stories.

The Fairbanks Hammer Company, Boston, Mass., has been incorporated with a capital stock of \$10,000. The directors are I. L. Jameson, president; Archibald Parsons, Chelsea, treasurer, and F. M. Whitman.

The Stanford Steel Products Company, Milford, Conn., is building an addition to its factory on Buckingham Avenue.

The Metallic Auto-Tire Company, Lynn, Mass., has been

incorporated with a capital stock of \$500,000. The directors are A. O. Seitz, president; Joseph Lazarus, Winthrop, treasurer, and C. P. Govostes.

Joseph Cotter, North Union Street, Somerville, Mass., has taken out a permit for the erection of a machine shop, 45 x 45 ft., one story.

The Superior Mfg. Company, Bridgeport, Conn., has been incorporated with a capital stock of \$75,000 by E. P. Hyde, P. J. Sullivan and Bessie M. Hyde.

The Springfield Tool Company, Springfield, Mass., has been incorporated with a capital stock of \$50,000. The incorporators are W. J. Roy, president; John A. C. Stevenson, 4 Temple Street, treasurer, and William Thompson.

The Cape Mfg. Company, Augusta, Me., has been incorporated with a capital stock of \$250,000 to manufacture threshing machinery. The directors are E. M. Leavitt, Winthrop, president and treasurer; Ernest L. McLean, Augusta, clerk; Frank E. Southard, E. J. Noble and Pauline Lowell.

The Universal Valve Company, Boston, Mass., has been incorporated with a capital stock of \$5,000. The incorporators are Carleton K. Berger, Roxbury, president and treasurer; J. J. Berger and H. R. Berger.

The United States Electric Generator Company, Providence, R. I., has been incorporated with a capital stock of \$200,000. The incorporators are Arthur P. Manchester, 363 Black Street; Harry W. Spooner, 164 Arnold Avenue; and E. A. Wilcox, 89 Ontario Street, all of Providence.

The New Haven Malleable Iron Company, New Haven, Conn., will operate a jobbing foundry exclusively, but owing to delay in receiving equipment will probably not start operation until after Jan. 1.

Chicago

CHICAGO, ILL., Nov. 11, 1916.

The past week has been one of exceptionally large business, the sales by nearly all of the local dealers exceeding those of any week in a number of months. This activity was occasioned by an increase in both domestic and export transactions. Inquiry from domestic manufacturers does not as a rule embrace any single lots of large size, though a notable exception to this rule is reported in the contemplated purchases of equipment by the Pullman Company to broaden the scope of its car shops. From abroad the renewal of interest is especially noticeable with respect to small swing lathes. Further sales are reported to Canada and to Japan, and the shipyards of the world are buying steadily. Some increase in railroad buying of machinery is noted, but for the most part they are still lagging behind. The Elgin, Joliet & Eastern Railway is in the market for a small list and the Missouri, Kansas & Texas Lines have let the contract for the erection of their new shops.

The Ajax Forge Company, 2499 Blue Island Avenue, Chicago, has awarded contracts for a one-story addition to its shop, the building to cost \$35,000.

Charles J. Menely, 2702 Warren Avenue, Chicago, will build a one and two-story factory, for which contracts have already been let at a cost estimated to be \$5,000.

Roger C. Sullivan, 122 South Michigan Avenue, Chicago, will erect a one-story brick shop at 121 North Curtis Street at a cost of \$5,000.

The Weaver Mfg. Company, Springfield, Ill., in addition to the erection of a manufacturing building will also add a new heating plant and an office building.

The Wabash Railroad advises that its new shop building at Decatur, Ill., may be held over until spring. E. F. Needham, Decatur, is superintendent.

The Vortex Mfg. Company, Chicago, has acquired a building at Western and Austin avenues which will be equipped to manufacture soda fountain apparatus.

The All-Steel Equipment Company, Aurora, Ill., will shortly let contracts for the building of a factory, 80 x 300 ft.

The McGuire-Cummings Company, Paris, Ill., suffered a loss estimated at \$100,000 as a result of fire which destroyed a section of its car shop.

The Stoever Steel Tank & Mfg. Company, Freeport, Ill., is planning the erection of an addition to its shop.

George G. Bayne, organizer of the Bayne Mfg. Company, Quincy, Ill., formed to manufacture automobile specialties, has completed arrangements for the erection of a factory at Bushnell, Ill.

The Sible Specialty Mfg. Company, Clinton, Iowa, is in the market for one set of 10-ft. bending rolls and one 10-ft. squaring shear having a capacity up to No. 12 gage steel and one second-hand punch press.

The Universal Hoist Company, Cedar Falls, Iowa, has

begun the construction of a one-story factory. It is expected that the new capacity will be in operation by Jan. 1.

The Manchester Street Sweeper Company, Mason City, Iowa, has purchased through W. G. C. Bagley, trustee, the plant of the Chase Mfg. Company in that city, which it will operate for the manufacture of its own product.

The Northwestern Malleable Iron Works, St. Paul, Minn., is about to erect a one-story foundry for which an expenditure of \$7,000 is contemplated.

Indianapolis

INDIANAPOLIS, IND., Nov. 13, 1916.

The Jackson Shovel & Tool Company, Hartford City, Ind., has been sold by the receiver to H. Channon, Chicago, for \$23,000.

The Motor Parts Company, Newcastle, Ind., is building an addition to its plant, 80 x 180 ft.

The P. L. Post-Mold Company, Marion, Ind., has been incorporated with \$7,500 capital stock to manufacture machinery. The directors are J. A. Searles, William Thorn and John W. Harvey.

Fire gutted the assembling room of the car works of the McGuire-Cummings Mfg. Company, Paris, Ill., Nov. 6, causing \$50,000 loss, destroying valuable drills, lathes, motors, etc.

The Gary Foundry & Machine Works, Gary, Ind., is planning extensions that will double the capacity of its plant.

The Muncie Cap & Set Screw Company, Muncie, Ind., has been incorporated with \$20,000 capital stock. The directors are John Stetter, William Wuthenow and Abe Feinberg.

The Indiana Power & Water Company, recently organized at Bloomfield, Ind., with H. L. Clarke and B. M. Simon, Chicago, in charge, has taken over the Indiana Light & Power Company, Worthington; the Home Light & Power Company, Bloomfield; the Elnora Light & Power Company, Elnora; the Myers Light & Power Company, Ogden; the Bicknell Light & Power Company, Bicknell, and the Linn Coal Company, Bicknell. The company has been authorized to issue \$240,000 in bonds and \$80,000 in stock.

The Meixell Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture automobile and vehicle parts. The directors are B. F. Meixell, Thomas E. Madden and Thomas J. Gannon.

The Periscope Spark Plug Company, Kokomo, Ind., has been incorporated with \$150,000, to manufacture spark plugs. The directors are A. E., J. M. and L. Long.

The Wheatland Light Company, Wheatland, Ind., has been incorporated with \$2,000 capital stock, to supply heat, light and power. Anderson C., John S. and Andrew E. Nicholson are the directors.

The Clo-Mix Company, Elkhart, Ind., has been incorporated with \$25,000 capital stock, to manufacture warm air registers. The directors are A. H. Beardsley, C. A. Mixer and H. E. Clover.

Detroit

DETROIT, MICH., Nov. 13, 1916.

Increasing activity has been noted in the machinery market and an unusually large number of small orders were placed last week. The tendency of the manufacturer seems to be to catch up as much as possible on back orders before taking many new ones. Collections are being asked in many cases on part shipments, and a growing conservatism is noticeable in supplying the trade. October was one of the largest months for construction work Detroit has ever known, and wood-working machinery has been in great demand.

The King Works, Detroit, tool manufacturer, has bought the building formerly leased by the Detroit Pneumatic Chuck Company, which is 35 x 115 ft., at Pollard and St. Aubin streets.

The Joliet Auto Specialties Company has been removed to St. Joseph, Mich., where it will be known as the Auto Specialties Company, occupying a factory with 75,000 sq. ft. of floor space. It manufactures a special automobile top holder and proposes to manufacture 4,000,000 in 1917.

The Clipper Belt Lacer Company, Grand Rapids, Mich., has decided to build a two-story addition to its factory on Front Avenue, 65 x 100 ft. A garage, 25 x 100 ft., will also be built.

The Monorail Company of America, Detroit, has been incorporated by John C. Frost, Richard G. Lambrecht and Louis A. Ewald, with \$50,000 capital.

The Lansing Stamping & Tool Company, Lansing, Mich., has increased its capitalization from \$40,000 to \$100,000.

G. F. Conway, general manager, states that the business has increased to such an extent that the present quarters will not take care of it, and ground will be broken shortly for a new factory.

The International Metal Stamping Company, Detroit, announces that it will build a new factory soon. O. L. Currier is president.

The Baker-Vawter Company, Benton Harbor, Mich., manufacturer of loose leaf and steel filing equipment, is erecting concrete and steel buildings to add 60 per cent more floor space for the manufacture of its metal cabinet filing line. The capitalization of the company has been increased from \$800,000 to \$1,500,000. William A. Vawter is president and William A. Vawter, 2d, formerly secretary, also becomes treasurer.

Cleveland

CLEVELAND, OHIO, Nov. 13, 1916.

Automobile manufacturers in the Central West are buying machinery, delivery in about a year, for making their 1918 cars. Some orders have been placed for drilling machines for delivery next November and for lathes to be shipped about September. The question as to the future use of plants that sprang up to handle munition work is becoming one of considerable interest in view of the fact that some of this work is being cleaned up and new orders are not forthcoming. Apparently no additional munition work has been placed here for some time, although manufacturers expect new orders to come out within the next few weeks. The plant of the Cuyahoga Stamping & Machine Company, Cleveland, built for munition work, has completed its contract and shut down, the management announcing that it expects to let it remain idle for some time. The Premier Brass & Forging Company, Cleveland, has finished work on a large shell order and has disposed of most of its machinery. Manufacturers claim that plenty of shell work is still to be had, providing steel could be secured at prices that would make it possible to take the orders. Among new machinery inquiries is one from the Norfolk & Western Railroad for about 35 machines. The American Steel & Wire Company, Cleveland, has revived an inquiry for about 15 machines it put out several months ago. The general demand for small lots of standard machine tools continues very active. Deliveries on turret lathes have improved and some makers are now able to make fairly prompt shipments on some sizes. Pneumatic tools are in heavy demand and considerable export business in this line is coming from England and Russia.

Plans for extensive plant and equipment improvements in the factory of the Hydraulic Press Mfg. Company, Mount Gilead, Ohio, have been completed. The erection of one building and extensions to the machine shop, power house, stock room, tool room and erecting shop buildings are provided for in order to meet increased demand. The machine shop will be enlarged by an addition 60 x 100 ft. Considerable new shop equipment will be needed for this, including a 20-ton electric traveling crane, a large motor-driven horizontal boring mill and a heavy duty motor-driven planer. A structural shop about 50 x 60 ft. will be erected, and a new high-speed cut-off saw and traveling crane installed. The plans also include the future extension of the erecting shop 47 x 130 ft. A 20-ft. extension will be added to the power plant and a 300-hp. Corliss engine and a 225-kw. generator. Two new steam boilers and stokers for three boilers will be added to the boiler equipment. An oil-storage building will be erected in which will be installed oil tanks with pumps, as well as steam-heating pumps, boiler feed pumps, etc. The main stock room will be extended and another story added for the storage of hydraulic valves, fittings, packings, repair parts, etc. The tool room will also be extended. For all of the building extensions brick and concrete construction with steel for the substructure work will be used.

The Atlas Bolt & Screw Company, Cleveland, has disposed of its plant on Marquette Avenue, and will erect a new plant on Ivanhoe Road, adjoining that of the Atlas Car & Mfg. Company. A factory, 160 x 600 ft., and an office building will be erected. New equipment will be required.

The National Tool Company, Cleveland, manufacturer of milling cutters, will enlarge its plant by the erection of a three-story addition, 30 x 190 ft. Some additions to its line of products are contemplated.

The Osborn-Crew Mfg. Company, Cleveland, maker of metal stampings and specialties, has acquired a site at East Thirty-ninth Street and the Pennsylvania Railroad, on which it will erect a new plant. W. S. Lougee, Cleveland, is the architect.

The American Shipbuilding Company, Cleveland, will enlarge the machine shop at its Cleveland yards by the erection of a one-story addition, 60 x 120 ft., and at its Lorain yards will build additions to the forge and boiler shops, 60 x 120

ft. and 40 x 110 ft. It is in the market for lathes, drill presses, forging presses, planing machines and cranes.

The P. & W. Machine Company, Cleveland, has moved its plant from Brownell Court to East Sixty-second Street near Euclid Avenue, and contemplates the erection of a new plant.

A new plant will be established in Cleveland by the Steel Car Company which has been organized with a capital stock of \$500,000 to build and repair steel and wooden freight cars. P. S. Joyce, president of the Illinois Car & Mfg. Company, Chicago, will be at the head of the company.

The Champion Stove Company, Cleveland, Ohio, on Nov. 1 passed to new ownership and management, C. H. Miller, president, and John A. Herbst, secretary and treasurer, selling their interests and retiring from the business. A. B. duPont and Fred C. Alber have purchased these, together with other interests in the company. A. B. duPont is president and Fred C. Alber is secretary and treasurer of the new board. The company proposes to broaden the lines and increase the output.

The Canton Auto Parts Mfg. Company, Canton, Ohio, recently incorporated, has secured temporary factory space in the building of the Ohio Automobile Company, 317 Court Avenue, and will begin operations shortly. It expects to start the erection of a permanent plant within a few weeks to manufacture piston rings.

It is announced that the building plans of the Buckeye Engine Company, Salem, Ohio, will result in practically the entire present plant being replaced by a new structure. A brick and steel machine shop, 120 x 380 ft., will be built and three or four more buildings are contemplated.

The Bryan Pattern & Machine Shop, Bryan, Ohio, has been incorporated with a capital stock of \$25,000. It will build a plant, 50 x 120 ft., to manufacture metal patterns for automobile parts and for other castings. E. C. Hagener will be the principal owner.

The Mathews Engineering Company, Port Clinton, Ohio, has purchased the plant of the Boley Wire Fence Company, Sandusky, Ohio, and will move to that city shortly. An addition, 33 x 100 ft., will be erected. It builds small electric light plants for residences.

The Bauer Mfg. Company, Marshallville, Ohio, has been organized with a capital stock of \$25,000 and will establish a plant to manufacture ladders and roof jacks. T. E. Steiner is president and J. J. Frazer secretary and treasurer.

Milwaukee

MILWAUKEE, WIS., Nov. 13, 1916.

A feature of the local general machinery demand the last week or two has been the unusually large requirement of flour and feed milling equipment. Makers of this equipment have not known so brisk a demand as now for 5 or 10 years and regard the buying movement as bringing this once important Milwaukee industry back into its own. Although orders for machine tools booked the first week in November have not been abnormally large, demand continues brisk and of a nature similar to that noted in recent months. All shops are sold a long time ahead and production continues at a high level without appreciable catching-up on deliveries. If no orders should be booked in November or December, tool builders would still be assured of capacity production until the middle of 1917, at least. Milwaukee building operations for the first ten months of 1916 were approximately \$12,000,000, or \$1,713,502 larger than for the corresponding period of 1915. The figures include an inconsiderable part of the industrial expansion in this district, inasmuch as only work within the city limits enters the building inspector's office, and a large part of industries are just beyond the limits. Local bank clearings are establishing new high records and are expected to approach the \$1,000,000,000 mark for 1916, compared with \$836,385,000 last year.

G. W. Buttles, general manager of the Silent Washer Mfg. Company, Appleton, Wis., is promoting the organization of a company to establish a malleable foundry to specialize in small castings. The capital stock of the proposed organization will be \$100,000.

The New London Motor Car Company, New London, Wis., has awarded contracts for the erection of a garage and repairshop, 46 x 80 ft.

The Universal Tool & Apparatus Company, Milwaukee, has been organized with a capital stock of \$15,000 by Oscar Werwath and William Baum.

The Wittlin Garage Company, Cedarburg, Wis., will build a repair shop addition, 40 x 70 ft.

The United States Glue Company, Carrollville, Wis., will build a new refrigerator building and ice machine room, 40 x 80 ft., two stories and basement, of reinforced concrete. The architect is Herman J. Eßer, Camp Building, Milwaukee.

Welke Brothers, Allen, Eau Claire County, Wis., will build a garage and repair shop, 40 x 80 ft., one story and basement.

The Wood Products Company, Ladysmith, Wis., is building a new enameling house, 20 x 30 ft., to contain four ovens, and is installing 7 lathes, doubling its production facilities. J. C. Young, Jr., is general manager.

A report from Kenosha, Wis., announces the organization of the Winther Motor Truck Company, with a capital stock of \$330,000, which will establish a plant at the outskirts of Kenosha. The promoter is Martin F. Winther, motor truck engineer. Further details have not been made public.

The Ladish-Obenberger Company, Cudahy, Milwaukee County, Wis., broke ground Nov. 10 for a one-story addition, 50 x 200 ft., to its drop forge works. The engineers are Klug & Smith, Mach Block, Milwaukee.

The machine shop of the New London Iron Works, New London, Conn., has been purchased from A. G. Tuma by Edward Brusch, DePere, Wis., who has taken possession and will be in active charge of the business.

The Diamond Match Company will enlarge its plant at Oshkosh, Wis., by the erection of a building, 160 x 165 ft., four stories and basement, of reinforced concrete, brick and steel. Old buildings are being razed and contracts for the new one will be awarded at once. L. Frank Gates is the local manager.

The Ashland Light, Power & Street Railway Company, Ashland, Wis., is preparing to erect a power house, 40 x 80 ft., to accommodate four 600-hp. boilers and one horizontal Curtis turbine engine of 8333 hp. capacity.

The Spencer Sign Service Company, Steevns Point, Wis., electric sign manufacturer, has incorporated its business. The initial capitalization is \$5,000. The works have been removed to the new quarters at Union and Portage streets. Spencer E. Swancutt is president.

Cincinnati

CINCINNATI, OHIO, Nov. 13, 1916.

The inquiry for machine tools is excellent, with the larger sized lathes leading. Not many orders, however, were placed last week by either foreign or domestic buyers. Leading car manufacturers are reported to be quietly inquiring for a varied class of machine tools, but have not lately placed any large orders. It appears that the machines wanted are for replacement purposes and not for enlarging the capacity of their plants. This same condition exists with the automobile manufacturers. Low pressure boilers and tanks are in excellent demand, and all manufacturers are very busy. The difficulty in obtaining prompt shipment on plates has had some adverse effect on this particular business.

No manufacturing plants in this part of the country have yet been compelled to shut down on account of the shortage in coal cars, as has been currently reported, and indications are now that they will be able to keep their power plants operating without let up during the winter.

The Charles Boldt Glass Company, Cincinnati, has taken out permit for a one-story brick, steel and concrete building to be erected at Red Bank at an estimated cost of \$50,000. It will be used partly for storage purposes.

The proposed plant of the Carlton Machine Tool Company, Cincinnati, will be located at Spring Grove Avenue and Meeker Street. The company recently acquired the plant of the W. E. Gang Company in West End.

The Bourne-Fuller Company, Cincinnati, will erect a warehouse addition at 617 West Front Street, estimated to cost \$12,000.

The John Douglass Company, Cincinnati, maker of sanitary pottery, has let contract for two additional brick kilns to be installed in its plant in West End.

The Comport Tool & Machine Company, Dayton, Ohio, has been incorporated with \$30,000 capital stock by William A. Hoffman and others to make dies and other machine-tool specialties.

The Alexander-Kramer Company, Dayton, Ohio, has been incorporated with \$15,000 capital stock to manufacture toys and small metal specialties. J. G. Alexander is one of the incorporators.

The Crown Hardware Mfg. Company, Dayton, Ohio, recently increased its capital stock from \$32,000 to \$60,000 and is having plans prepared for a large addition to its plant.

The Acme Carburetor & Mfg. Company, Dayton, Ohio, has increased its capital stock from \$10,000 to \$15,000 and will add to its manufacturing facilities.

The Foos Gas Engine Company, Springfield, Ohio, has lately received several large domestic orders for internal combustion engines, and is now operating its plant with a night shift.

The Central Glass Company, Springfield, Ohio, is remodeling the former plant of the Eagle Glass Company. Practically all the extra equipment has been ordered.

The Phelps Mfg. Company, Columbus, Ohio, maker of wire wheels, intends to increase its capital stock at an early date and will add to its manufacturing facilities.

The Bryan Pattern & Machine Company, Bryan, Ohio, has been organized for the purpose of making wood and metal foundry patterns, and also machine-tool products. The company is now erecting a factory building that will be completed before Jan. 1. C. L. Newcomer is one of the organizers of the company.

Baltimore

BALTIMORE, MD., Nov. 13, 1916.

A. W. Gleske, 3 East German Street, Baltimore, has purchased the property of the Spedden Shipbuilding Company, Boston Street, Baltimore, and plans to install modern equipment. Included in the plant are machine shops, marine railways, etc.

J. J. Mott and R. L. Jenkins, Radford, Va., are interested in the formation of a company which will manufacture bricks.

An addition to cost about \$5,000 will be built by the O. K. Foundry Company, Richmond, Va.

The Norfolk Shipbuilding & Drydock Company, Norfolk, Va., has been organized with \$1,500,000 capital. Harry G. Skinner, 1414 Continental Building, Baltimore, is president. The company is understood to be contemplating the construction of a plant on the Elizabeth River.

Woodward & Son, Stockton and Fourth streets, Richmond, Va., are seeking prices on machinery for the manufacture of excelsior.

The Baltimore Gas Appliance & Mfg. Company, Bayard and Hamburg streets, Baltimore, will build an addition at Bayard and Nanticoke streets to cost \$10,000.

The Central South

LOUISVILLE, KY., Nov. 13, 1916.

Expectation that a means of relief from the car shortage situation will be provided shortly has resulted in increasing confidence of customers of local dealers and manufacturers in most lines. Manufacturers of bars, sheets, plates, tubes, etc., note inquiries from all sections of the country and refer to standing orders from numbers of customers who say they are in the market for anything in the line at all times. Numbers of communities in this part of the country have just passed bond issues for lighting plants and water systems or both, and the demand for these classes of equipment is larger. Inquiries for ice manufacturing machinery have increased, although a disposition is apparent to await lower prices.

B. F. Avery & Sons, manufacturers of agricultural implements, Louisville, Ky., have increased their capital stock from \$1,500,000 to \$2,300,000. Charles F. Huhlein is president.

The Baltimore & Ohio Railroad, it is reported, is making preparations to build new freight terminals at Louisville, estimated to cost \$200,000.

A bond issue of \$10,000 for installation of a municipal lighting and water plant has been voted by Olive Hill, Ky.

The city of Murray, Ky., has voted a bond issue of \$20,000 and will purchase or install a city water and light plant.

The city of Winchester, Ky., has voted \$180,000 in bonds to buy the plant of the Winchester Water Company, or build a new one, and to extend the mains to a pumping station to be erected on the Kentucky River.

The city of Versailles, Ky., has voted \$20,000 in bonds for improving the municipal water system.

The city of Lancaster, Ky., has voted \$250,000 in bonds for extension and improvement of its water system, proposing to take water from the Dix River. R. C. Anderson is the engineer.

Chattanooga, Tenn., is erecting a machine shop for repairing the city fire and motor-driven equipment.

The factory of the L. F. Moore Carriage Company, Knoxville, Tenn., was destroyed by fire with a loss estimated at \$11,000.

The Poe Cotton Seed Products Company, Memphis, Tenn., proposing to manufacture cotton seed products, has been incorporated with capital stock of \$100,000 by H. F. Poe, Jr., Robert Wilson, W. M. Swift and others.

Birmingham

BIRMINGHAM, ALA., Nov. 13, 1916.

Wholesale machinery remains very active, with an especially large demand for and heavy sales of wood-working machinery, owing to the activity of the lumber mills. Trade is good in every direction and deliveries occupy attention. Collections are comparatively prompt.

A. S. Bacon & Sons, Savannah, Ga., have been incorporated with a capital stock of \$150,000, to manufacture lumber. A. S., Hal H. and Oliver T. Bacon are interested.

Meritas Mills, Columbus, Ga., will build a \$250,000 addition.

W. L. Cleveland and C. V. Truitt, La Grange, Ga., and others propose to build a meat-packing plant to cost \$200,000.

Wilson & Co., Chicago, will build a meat-packing plant in Jacksonville, Fla., at a cost of \$125,000.

The National Lock Company, Rockford, Ill., it is reported, contemplates building a plant at High Point, N. C., but final action has not yet been taken.

The Carolina Woodenware Company, Fayetteville, N. C., incorporated with a capital stock of \$50,000, proposes to manufacture lard tubs, candy pails, etc. H. W. Lilly is president and J. C. Cowell, secretary.

The Southern Desk Company, Hickory, N. C., will build a foundry for the manufacture of desk castings and is seeking prices on cupola, fan and tumblers. It will be of mill construction, 75 x 160 ft.

St. Louis

ST. LOUIS, Mo., Nov. 13, 1916.

The buying of machine tools continues steadily, with an aggregate of business which maintains a really high level. No recession in transactions has been apparent even through the election period. Deferred deliveries are taken calmly by buyers and 9 to 12 months are not infrequent terms of shipment. Second-hand tools are not affecting the market at all, although a few are now and then to be picked up as long deliveries are met and replaced equipment is released. General business conditions, both manufacturing and retail, are reported excellent, with collections extremely good and money very easy for both permanent investment and for commercial loans.

The A. Leschen & Sons Rope Company, St. Louis, is now constructing an administration building adjoining its wire rope plant at a cost of \$100,000. It is to be 75 x 115 ft., three stories. The general offices will occupy the first two floors, while the third floor will contain dining rooms, kitchen, and rest rooms. In the basement will be recreation rooms and shower baths. The factory buildings since 1903 have occupied a 33-acre site in the northwest section of St. Louis, while the offices have been in the downtown district.

The Electrograph Company, Kansas City, Mo., has been incorporated with a capital stock of \$1,000,000 by J. F. Rudd, A. L. Landsberg and M. T. Miller to manufacture electrical advertising apparatus, etc.

The Ever Tight Piston Ring Company, St. Louis, Mo., has been incorporated with a capital stock of \$75,000 by J. W. Roland R. and J. W. Reinholt, Jr., to operate the business formerly owned by R. Koehler & Son, which will be increased in capital.

The F. C. Schwaner Machinery Supply Company, St. Louis, has been incorporated with a capital stock of \$10,000 by L. E. and E. P. Schwaner, M. B. Stewart, B. E. Reed, and others.

The Fulton Iron Works, St. Louis, Mo., will build an addition for a steel forgings plant at a cost of about \$500,000.

The American Fixture & Show Case Mfg. Company, St. Louis, has leased new quarters at 1010 Lucas Avenue and will increase its wood-working plant capacity. Milton D. Mendle is president.

The Moon-Hopkins Billing Machine Company, St. Louis, Mo., is planning manufacturing plant extensions, details of which have not been completed.

The Riehl-Miller Company, Webster Groves, Mo., has leased quarters at 1507 Olive Street, St. Louis, which it will equip for machine work, etc.

The Winter Garden & Ice Company, St. Louis, Mo., has increased its capital from \$125,000 to \$350,000 and will equip its ice-making and refrigerating plant for maintaining an ice skating rink as well as an ice-making and refrigerating plant for general purposes. H. C. Wood and M. E. Springer, both of Cincinnati, are the principal owners.

The Empire District Electric Company, Joplin, Mo., will improve one of its electric generating plants, installing equipment to cost \$25,000. B. C. Adams is manager.

A mill and grain elevator of 5000 bbl. of flour per day capacity will be built at St. Joseph, Mo., by the Larabee Flour Mills Corporation, Hutchinson, Kan., at an estimated cost of \$500,000.

L. J. Goodrich, Mountain Home, Ark., is in the market for one 100-kw. 3300-volt three-phase turbine, a water turbine, etc.

S. E. Lasley will install at Enola, Ark., a cotton-seed oil mill of 20 tons daily capacity, including presses, seed cleaner, cake mill, etc.

The Baxter Electrical Utilities Company, Cotter, Ark., will equip an electric light and power plant at Cotter and also a hydroelectric plant on White River, developing about 10,000 kw.

The McGehee Water & Light Company, McGehee, Ark., will install a Diesel engine and generating machinery to cost about \$12,000.

The oil mills at Little Rock, Ark., of the Southern Cotton Oil Company, which have been burned with a loss of \$25,000, will be replaced.

The automatic coal chute of the Iron Mountain Railway at McGehee, Ark., has been burned with a loss of \$30,000. It will be replaced. E. A. Hadley, St. Louis headquarters, is chief engineer.

The Oklahoma Oxygen Company, 406 North Hudson Street, Oklahoma City, Okla., T. S. Chambers, president, will install machinery to manufacture oxygen and is also in the market for internal combustion engines.

The Ardmore Specialty Company, Ardmore, Okla., R. B. Wright, president and manager, is in the market for boilers, electric motors, gas engines and other equipment.

The Machinery Mfg. Company, Henryetta, Okla., has been incorporated with a capital stock of \$20,000 by C. J. Tanquary, W. J. Caldwell and F. H. Blackford.

Van Dunham and W. E. Whittaker, Chickasha, Okla., will equip a machine shop, 25 x 100 ft.

A steel car building plant to cost about \$500,000 is to be equipped at New Orleans, La., by the Southern Car Company, High Point, N. C.

Texas

AUSTIN, TEX., Nov 11, 1916.

The Post City Water Company will construct a waterworks plant at Post City to cost about \$170,000. Lawrence J. Montgomery is an incorporator.

The Knox Lumber Company will install an electric light and power plant at East Mayfield, where its lumber mill is situated. It will build a transmission line to Hemphill and furnish light and power for that town.

The Stark Lumber Company, Memphis, Tenn., plans to build a hardwood sawmill at Beaumont. W. A. Stark is president.

The City Council of Wellington will award the contract soon for the construction of a waterworks plant to cost about \$27,000.

The City Council, Miami, will award the contract soon for the installation of an electric light and power plant.

A. F. Trautwein, Cuero, and associates, plan to build a cotton gin to cost about \$25,000.

Power Brothers, who recently bought the brick-making plant of the Abilene Press Brick Company at Abilene, will install additional machinery.

The Chambers Auto Supply Company, Cameron, will build a garage and machine repair shop.

The Pacific Northwest

PORTLAND, ORE., Nov. 7, 1916.

The demand for machinery in outside construction has been good owing to the fine weather. Many plants that usually close a month earlier are still operating and considerable new construction and development work has been undertaken. Mining machinery is less brisk, although considerable machinery for mill equipment has been under inquiry. Agricultural implements are active.

While the situation in the coast lumber and shipping districts is favorable, car and vessel shortage is still a serious drawback. Reports from the eastern parts of Oregon, Washington, Idaho and Montana, indicate a condition of unparalleled prosperity which is bringing out a heavy demand for small equipment, building accessories, farm implements, etc., as well as for large units required in mining, hydroelectric development, irrigation work, etc. Some expansion is taking place in both the large and small manufacturing industries. Exports of machinery, railroad equipment and steel products through Pacific ports continue heavy.

The Peninsula Shipbuilding Company, Portland, will build two new sets of marine ways, and will begin work on several auxiliary schooners.

The Eugene Iron Works, Eugene, Ore., is starting work on a new shop, 40 x 68 ft., and will soon add another building, 40 x 40 ft.

Plans are being drawn for a suction dredge for the Port of Bandon, Ore., to cost about \$30,000.

The Seattle Construction & Drydock Company, Seattle, Wash., has placed a contract with the McAtee Shipbuilding Company for constructing the hull of a floating drydock of 12,000 tons capacity.

The International Harvester Company will build a five-story distributing warehouse and branch factory at Salt Lake City, Utah, to cost about \$100,000.

The merger of the Pacific Alaska Navigation Company and the Pacific Coast Steamship Company under the name of the Pacific Steamship Company became effective Nov. 1. Headquarters have been established in Seattle in the building of the Pacific Coast Steamship Company.

Robert Armstrong, Victoria, B. C., plans the establishment of a machine shop at 134 Kingston Street, to cost about \$3,000.

The Oregon Box & Mfg. Company, Bay City, Ore., recently purchased a tract of 3,000,000 ft. of timber, which will be immediately utilized.

The Pacific Coast Shipbuilding & Drydock Company, Tacoma, Wash., has been incorporated by a number of Tacoma business men, including J. H. Hyde, and will construct a shipbuilding plant and drydock. It is capitalized at \$500,000.

The J. F. Duthie Shipbuilding Company, Seattle, has recently received a contract from Hannevig & Johnson, New York brokers for Norwegian interests, for the construction of a steel steamship of 8800 tons. This is the sixth vessel which the company has under contract to be completed within 15 months.

F. C. Harley, Astoria, Ore., is at the head of a syndicate which plans the establishment of another shipbuilding plant in Seattle and holds contracts for four wooden ships costing about \$1,000,000. A plant will be constructed as soon as a site has been obtained.

The City of Portland Motorship Company, Portland, Ore., has been incorporated with a capital stock of \$227,500 by Hamlin F. McCormick, Ernest H. Meyer, William B. Wiggins, and others, and plans the establishment of a shipbuilding plant nearby.

The E. I. du Pont de Nemours Company recently secured a site of 40 acres in Wallace, Idaho, on which it is reported a plant for the manufacture of explosives will be located.

The Winslow Marine Railway & Shipbuilding Company, Eagle Harbor, Wash., plans to resume shipbuilding work and will construct a wooden hull steam freighter to cost \$200,000. The plant has been engaged in repair work since July 1. A number of improvements and extensions will be made.

The Hansen Packing Company, Butte, Mont., has started construction on a four-story packing plant, 125 x 250 ft., to cost more than \$500,000.

The Western Gear Works, 1706 Fourth Avenue South, Seattle, will erect a two-story brick factory at Ninth Avenue South, which will house its proposed gear-cutting and special manufacturing plant.

The Puget Sound Boiler Works, 3442 Twelfth Avenue South, Seattle, Wash., has recently awarded contract for a one-story addition to its plant, 40 x 90 ft.

The Ames Shipbuilding & Dry Dock Company, Seattle, has been incorporated for \$800,000 by Edgar Ames, president of the Seattle General Contract Company, and plans the erection of a shipbuilding plant in Seattle and a drydock of 7000 tons capacity. The company has contracts for three steel steamships of 8800 tons each.

The Northern Pacific Railway plans to begin work immediately on the proposed improvements to its carshops and yards at Laurel, Mont., to cost about \$15,000.

Canada

TORONTO, ONT., NOV. 13, 1916.

The Utilities Board, London, Ont., proposes to install an auxiliary pumping plant at a cost of \$25,000. E. V. Buchanan is general manager.

The City Council, Sault Ste. Marie, Ont., has appointed a committee to report on the purchasing of two motor-driven pumps with a capacity of 5,000,000 gal. per day each.

J. W. Cline, Aylmer, Ont., proposes to erect an implement shop at a cost of \$4,000. A site has been secured.

Tenders are being received for the erection of a brick addition to the plant of the Galt Brass Company, Macadamized Road, Galt, Ont. J. Evans, 30 Water Street, is the architect.

The Munder Tungsten Lamp Company, Ltd., Guelph, Ont., will build a brick addition to its plant to cost \$15,000. J. S. Wheeler is general manager.

Mr. Bennet, 206 King Street West, Toronto, is in the market for 18 to 24 in. engine lathes, shaping, milling, vertical drilling and tool grinding machines.

W. H. Banfield & Sons, 372 Pape Avenue, Toronto, manufacturer of steam power hammers, punches, presses, etc., has commenced the erection of an addition to their plant to cost \$10,000.

The Central Motors, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by George W. Boake, 487 Brunswick Avenue; Bidwell N. Davis, Continental Life Building, Bay Street; Joseph Bonnefield, and others to manufacture automobiles, etc.

The William Candler Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by William Candler, 89 Stephenson Avenue; Robert T. Watt and others, to manufacture wagons, carriages, etc.

The Shell-Bar Grate Company, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Joseph M. Bulle, 21 Grenadier Road; Harold L. Steele, 437 Broadview Avenue; Wendell Osborne and others, to manufacture grate bars, etc.

McMullen & Lee, Ltd., Toronto, has been incorporated with a capital stock of \$40,000 by Harold S. McMullen, 73 Lonsdale Road; William H. Lee, 84 Oriole Road; John F. MacGregor, and others, to manufacture motor cars, machinery, etc.

The Dominion Porcelain Corporation, Ltd., Preston, Ont., has been incorporated with a capital stock of \$150,000 by Gideon Grant, 632 Traders' Bank Building; Mervil MacDonald, 72 Alexander Boulevard, Bruce Williams and others, to manufacture porcelain and clay products.

The Breen Motor Company, Winnipeg, is erecting a garage to cost \$35,000.

The Willys-Overland Company, Winnipeg, has commenced the erection of a reinforced concrete and brick garage on Portage Avenue to cost \$60,000.

The Ontario & Manitoba Cold Storage Company, Winnipeg, proposes to build a cold-storage plant to cost \$100,000.

The Sterling Engine Works, Ltd., Winnipeg, has been incorporated with a capital stock of \$25,000 by Vincent C. Maddock, Roy M. Wolvin, William J. Leaney, and others, to manufacture steam and gasoline engines, boilers, agricultural implements, etc.

The Foundry Products, Ltd., Calgary, has been incorporated with a capital stock of \$500,000 by Daniel L. Redman, Charles W. Coole, Peter D. McAlpine and others.

The Dominion Fire Brick & Clay Products, Ltd., Moose Jaw, Sask., has been incorporated with a capital stock of \$500,000 by Arthur Hitchcock, Edward C. Mathews, Alfred R. Turnbull and others.

M. J. O'Brien, Renfrew, Ont., has commenced the erection of a power plant at Calabogie, Ont., at a cost of \$500,000. It is the intention to build dams and erect a power house for the generation of 5000 hp. Mr. O'Brien is removing his head office from Montreal to Renfrew, and will establish additional industries at the latter place.

The William Davies Company, Ltd., Toronto, will erect a cold-storage plant at the corner of Cypress and Front streets, at a cost of \$100,000.

The Colonial Pulp & Paper Mills, Ltd., Quatsino Sound, will erect a sulphite mill with a capacity of 120 tons a day. The first unit will have a capacity of 60 tons. It is expected that the plant will be completed in about a year.

The American La France Fire Engine Company, Toronto, will erect an addition to its plant at Westport Avenue and Weston Road, to cost \$6,000.

The McLaughlin Motor Car Company, London, Ont., will erect an addition to its plant on Richmond Street, to cost \$6,500.

The Canadian Carbon Company, Toronto, will erect a three-story factory on Paton Road, to cost \$23,400.

Tenders are being received for an addition to the plant of the Booth Coulter Copper & Brass Company, Ltd., 115 Sumach Street, Toronto, to cost \$5,000. Bond & Smith, 15 Wilton Avenue, Toronto, are the architects.

Work will be commenced at an early date on the erection of an addition to the Loudon Machinery Company, Guelph, Ont., to cost \$6,000.

The Metal Drawing Company, Mill Street, St. Catharines, Ont., has let contract to Robert Williams, 9 Beecher Street, for the construction of a foundry.

The Canada Stove & Furniture Company, Ltd., St. Laurent, Que., will build a factory to cost \$16,000. William Mahoney, Guelph, Ont., is the architect.

The Exolon Company, Thorold, Ont., will build an addition to its plant there to cost \$100,000.

The London Machinery Company, 699 Bathurst Street, London, Ont., proposes to install electric equipment and machinery for the manufacture of munitions. W. Yates is manager.

The Frederickhouse & Abitibi Pulp Wood Company, now being organized at Cochrane, Ont., proposes to build saw mills and a wood-working plant at a cost of \$150,000 and later to erect a rossoir plant. J. A. McAndrews, Lumsden Building, Toronto, is a stockholder.

H. Deltman, Kinnmount, Ont., is in the market for a 60-hp. engine and 75-hp. boiler for a sawmill.

The Universal Smokeless Heat Generator Company, Victoria, B. C., has been incorporated for \$50,000. It will acquire patents held by its stockholders for improvements in heat-generating processes and furnaces.

The New Westminster Foundry Company, Ltd., incorporated in New-Westminster, B. C., to carry on a general business of iron founders, boilermakers, etc.

Government Purchases

WASHINGTON, D. C., Nov. 13, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 362, for one surface grinding machine and one universal milling machine for Washington; schedule 363, for one oxy-acetylene machine for Norfolk; schedule 364, for two turbo-generating sets for Charleston; schedule 365, for one 24-in. turret lathe for Boston; schedule 376, for one 30-ton steam locomotive crane and two 5-ft. universal r.dial drilling machines, all for Washington; schedule 378, for two turbine bucket-cutting machines for Newport.

Bids will be received by the Bureau of Yards and Docks until 11 a. m., Dec. 11, under specification 2259, for one 250-ton floating revolving crane for Mare Island, extending time set from Nov. 11. Similarly the time of opening proposals on specification 2261 for one 50-ton locomotive jib crane for Pearl Harbor, T. H., has been extended to 11 a. m., Nov. 27.

The general purchasing officer of the Panama Canal will receive bids until 10.30 a. m., Dec. 2, under circular 1100, for a boring machine, a milling machine and a lathe.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, Nov. 7, for supplies for the navy yards as follows:

Schedule 249, Steam Engineering

Class 1, Puget Sound—One jaw riveting machine—Bid 98, \$1,575; 166, \$1,250.

Schedule 262, Construction and Repair

Class 32, Mare Island—One thread rolling machine—Bid 98, \$3,260.

Schedule 280, Construction and Repair

Class 91, Norfolk—One toggle press—Bid 26, \$2,790; 134, \$2,850; 135, \$2,873.

The names of the bidders and the numbers under which they are designated in the above list are as follows:

Bid 26, E. W. Bliss Company; 98, Manning, Maxwell & Moore, Inc.; 134, D. H. Stoll Company, Inc.; 135, Sherritt & Stoer Company; 166, Watson-Stillman Company; 168, White Company; 180, Frank O. Renstrom Company.

Ferroalloys from German Slags

An invention which may have some bearing on one phase of Germany's manganese supply is found in a patent (U. S. 1,196,185, Aug. 29, 1916) recently granted to Friedrich von Holt of Georgsmarienhütte, Germany. Taking furnace slags, comparatively low in phosphorus and often containing manganese, the inventor makes a specular iron rich in phosphorus which he suggests can be used in making steel as a substitute for the usual additions, introducing the required amount of manganese and phosphorus for certain steels and producing ferrophosphorus directly, if little manganese is present. The phosphatic slag is added to the charge of a gas producer. According to the inventor, the heat causes the basic constituents of the slag to combine with the silicates of the ash, while the phosphorus forms with the iron the desired ferrophosphorus. The operation of the producer is not unfavorably affected, it is claimed. High manganese slags, it is stated, produce the specular iron rich in phosphorus.

NEW TRADE PUBLICATIONS

Electric Industrial Truck.—Samuel L. Moore & Sons Corporation, Elizabeth, N. J. Bulletin No. 103. Points out the advantages of the company's type F electric industrial truck, which includes a strong and simple construction, ready accessibility to all parts for making mechanical adjustments and the use of a spur and worm drive which is completely inclosed, thus eliminating chains or exposed gears that are likely to break or pick up dirt or loose material from the runways. The construction is described at some length, the text being supplemented by a number of engravings. A condensed set of specifications and a diagram giving the principal dimensions are included. A number of views of the truck handling pig iron, castings, oil barrels and cement are presented.

Electric Hoists.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletin M-1. Refers to a line of electric floor-operated hoists which are made in three sizes ranging from 500 to 2000 lb. A brief description of the hoists is given and dimension diagrams and tables and a condensed table of specifications are included. A view of the hoist in use in a machine shop is presented.

Steam Turbines.—Moore Steam Turbine Corporation, Wellsville, N. Y.—Bulletin No. 1. Presents illustrations, diagrams and brief descriptions of a line of single and multi-stage turbines which are built in sizes ranging from 5 to 1000 hp. The turbines consist of a single velocity stage, coupled with two or more single pressure stages. The description of the construction is quite extensive and is supplemented by a number of line drawings and halftone engravings. Mention is made of other products upon which the company is prepared to quote, such as double helical reduction gears, turbo generator and blower units, turbine-driven pumps, exhaust steam and geared belted turbines, etc.

Sand and Gravel Pumps and Wearing Parts for Dredges.—American Manganese Steel Company, McCormick Building, Chicago, Ill. Bulletin No. 72. Covers a line of manganese steel sand and gravel pumps and wearing parts for pump dredges. A brief description of a centrifugal pump for handling sand and gravel in which manganese steel is used largely is briefly described, the text being supplemented by a number of views of parts of the pump and installations. Views of the liners and runners that can be supplied are presented, as well as engravings of the manganese steel cutters, spurs and cutter blades which are employed to remove material where the formation is too solid for the suction power of the pump to remove it.

Reflectors.—National X-Ray Reflector Company, 235 West Jackson Boulevard, Chicago, Ill. Volume II, No. 7, of the company's house organ, "Eye Comfort." With this issue a departure has been made from the stereotyped form of house organs. The new magazine consists of a series of 8 x 10 in. loose leaves, so that it will be possible for the readers to file the information given in which they are particularly interested without having to cut the magazine apart, and in some cases damaging other information that they desire.

Elevating Truck.—Lewis-Shepard Company, 262 Dover Street, Boston, Mass. Two circulars. Give general descriptions and specifications for an elevating truck used with platforms in the transportation of stock and material in industrial establishments. The various features of the truck are mentioned and illustrated, special emphasis being laid upon the fact that the load is raised either 2 1/2 or 3 in. A condensed table of specifications is included. An illustrated description of the truck appeared in THE IRON AGE, May 4, 1916.

T-Squares and Drawing Boards.—Emmert Mfg. Company, Waynesboro, Pa. Pamphlet. Gives illustrations and brief descriptions of a line of vertical and horizontal T-squares and drawing boards. The advantages of using vertical drawing boards from the standpoint of speed and health are touched upon, with a diagram showing the 12 operations required to draw two measured lines at right angles with T-square, triangle and scale and the two operations with the company's T-square. General descriptions of the boards, one of which was illustrated in THE IRON AGE, May 11, 1916, are included.

Turbo-Undergrate Blower.—B. F. Sturtevant Company, Hyde Park, Boston, Mass. Bulletin No. 1022. Treats of a turbo-undergrate blower for increasing the draft and thus enabling more steam to be produced with the present boiler equipment. The advantages of using the blower are pointed out and a number of plants in which they have been installed are illustrated, with brief statements of the work that has been done. A partial list of users is included.

